ARCHIVES OF OPHTHALMOLOGY.

BINOCULAR OPHTHALMOTROP.

By W. BROWNING.

(*With plate vi* a.)

THE apparatus herewith presented is intended for demonstrating the movements of the eyes as a whole. The aim has been to do this, as far as possible, in a natural way, and not to demonstrate a principle alone, but to apply it on representative eye-models in an exact and evident manner.

The chief points to be accomplished are:

1. Demonstration of Listing's law:—"The collective revolutions of the eye, from the primary position, take place on axes which lie in one single plane."

2. An arrangement for adjusting an axis in this plane (Listing's axis) corresponding to any selected point of vision, and also for measuring its inclination.

3. Demonstration and proof of Donders' law. This is that "for every value of the lateral angle and of the vertical angle there is, both in direction and extent, an exactly corresponding angle of revolution around the antero-posterior axis of the eye." By vertical angle is meant that of elevation respectively of depression. This, of course, necessitates the measurement of all these angles for any given secondary position of the eye.

Description.—Letters are used to designate the separate parts of the apparatus, and figures for any portions of these requiring special reference. It is also convenient to designate the antero-posterior axis by x, and any axis in the equatorial plane, that is, any Listing's axis, by y.

The primary position corresponds to that of rest with the axis x horizontal and directed straight forward.

The movements are considered those of perfect spheres.

Fig. 1 represents one of the symmetric halves of the model already constructed. Fig. 2 gives a photographic view of the combined apparatus when directed to a point to the left and upward.

For the two eyes two perfectly turned hard wooden balls, *a*, *a*, are taken. Each is bored directly through the centre for the introduction of a rod, *b*, which in position acts as the axis x. This rod is fixed firmly in the ball, and extends an equal distance anteriorly and posteriorly like poles.

Into each sphere in its whole equatorial circumference, and therefore perpendicular to the axis x, is cut a groove, 1, rectangular in section.

The balls *a*, *a* are retained in position by two supporting-rings, *c*, *c*, grasping the ball in front and behind with any required degree of firmness; leaving between them, however, a space corresponding to the groove 1, or at most a trifle wider.

The rings themselves must have a considerable width; each is somewhat like the segment of a cone, but slightly concave interiorly to adapt it to the spherical surface of the ball. From that part of the rings facing each other, *i. e.*, from their largest circumference, there is an extension, a kind of rim or flange, 2,[1] directly outward. The depth of the groove 1 is thus increased by the width of the rim 2.

The rings *c*, *c* rest on supports or feet, 3, 3, attached nearer the smaller periphery of *c*, *c*, thus not only acting more securely as supports, but leaving the rim-extensions 2, 2 free in their whole circumference. The supports 3, 3, after passing down a short distance, are bent outward to leave room for other parts, and after again bending downward are firmly fastened to the board *d*, which forms the base.

The rings *c*, *c* not only hold the spheres in position, but

[1] The parts 2, 4, and 7 are not visible in either of the figures.

also bear between them another ring, *e*, in section like the capital T. One part of this plays between *c*, *c*, while the other overlaps 2, 2.

By this arrangement the ring *e*, although readily revolved, is held in suspension so closely as to admit of no further movement than the rotary one.

The ring *e*, moreover, at two points on its circumference directly opposite, carries processes projecting internally, 4, 4, as well as externally, 5, 5. The two directed centrally, 4, 4, have each a width and length sufficient to exactly fill a section of the groove 1. Both the internal ones, 4, 4, and the external ones, 5, 5, are cylindrical in form, that they may act as poles or axes of revolution. The external ones are to carry the bow-piece *f* described further on.

The corresponding external and internal processes 5 and 4 on the outside of each ring *e*, are bored quite through for the introduction of a screw, *g*. This is sharp-pointed and supplied with a millet-head as a thumb-screw which also retains *f*.

When the ring *e* is in any given position, it can by means of *g* be retained there, and likewise the ball *a* will be obliged to revolve on the opposite 4, 4 as an axis.

To *e* is also attached an indicator, 6, at the middle point above where it primarily points to zero on the scale *h*; this scale is mounted on the posterior of the rings *c*, and thus remains in any case fixed, so that the exact divergence or amount of revolution of *e* is thereby indicated.

Upon the processes 5, 5 is hinged a bow, *f*, in the shape of a half ellipse arching forward; this is free to swing perpendicular to the line of processes, whatever position that may assume. At the centre in front, instead of being simply continuous from side to side, it bends forward so as to glide by the front elongation of the rod *b*. Moreover, at the middle of this bend it is bored for the reception of the long rod *i*, pointing forward and likewise always perpendicular to *y*.

This can also be lengthened or shortened at pleasure while operating it, by means of a close-fitting sheath,

which is still free enough to glide back and forth over nearly its whole length. These two sheaths on the rods *i*, *i* must be connected together in some way at their outer extremity, and yet so as to leave all the freedom of movement of a universal joint. This is accomplished by means of ball-and-socket joints at the end of each, and a very short continuation from these, with a simple hinge joint, 7, for the real point of intersection. In this manner a universal joint is secured, while the rod *i* and its short extension adjust themselves as one straight line. By simply loosening the attachment at 7, each part can act for itself. The rod *b* has its posterior end quadrangular that it may be held by a receiver, *k*, so long as the ball remains in the primary position.

Near its anterior end the rod *b* is perforated for a rivet to hold the bow *f* when the whole instrument is at rest.

This same rod *b* acts as the bearer of three other parts: one is a short strip, *m*, firmly attached to *b*, at a little distance from the front of the ball; it is in the form of a curve parallel to and always remaining concentric with the surface of the ball. Its upper free end has its width transverse, and is marked with a short scale.

The second piece borne by *b* is a half circle, *u*, passing under the ball between 3, 3. This is not attached fast to *b*, but is left free enough for the axis to revolve in it. This semicircle must have some width in its own plane, and bears a scale having its zero at the middle point below. It has a continuation, 8, upward in front, parallel with the scale *m*, before which its upper free end acts as an indicator.

Underneath the ball and just above the scale-plate *o* the semicircle passes through a guider, *p*, which is thereby turned to the right or to the left corresponding to the movement of *n*.

This is made possible by *p* revolving freely on a part of itself, 9, passing perpendicularly through the base *d* at a point directly under the centre of the ball. Another portion of *p* is a very short indicator, 10, attached to its outer side, pointing centrally upward for reading the scale on *n*.

The part *p* bears another indicator, 11, at right angles to the last one, 10; it extends forward in the same plane as the semicircle *u*.

By having 11 equal to the radius of *n*, an equal minuteness of measurement is secured.

This pointer 11 takes its course parallel with and near to the base *d* on which is a scale-plate, *o*.

This plate *o* is traversed by the axis 9 of the part *p* and bears most of the apparatus, the parts 3, 3 resting on it.

As already mentioned, for retaining the sphere as long as desired in the primary position, a slight additional piece, *k*, is brought on at the back of the base *d;* it is a small, triangular, elastic sheet of metal, attached by one side to the margin of the base. This piece *k* is perforated by an angular hole at a point to be occupied by the posterior end of *b*, when in the primary position. By pressing back *k* the ball will be free to revolve; on returning again to the primary position the feathering action of *k* allows *b* to slip automatically into the receiver, there to be held until again freed.

The larger the apparatus is made so much the finer can the scales be divided; it should certainly be on a basis of several times, in the present apparatus three-fold, the size of the human eye. The two halves are almost identical, only the markings on the scales *n*, *n* and the introduction of the screws *g*, *g* are more convenient from the outer side. The measurements, however, except when directed in the median plane, are not identical.

The spheres form the most important part of the apparatus, and it is their motions that are sought. Either of these, that it may direct itself to any external point, must have all the possibilities of movement of a universal joint, but such movements are resolvable into direction and extent. The free revolution of *a* is only limited by the processes 4, 4 of the ring *e;* these, however, limit its direction only, while the rotating of the ring *e* within its enclosure, and therefore the inclination of the axis-line 4, 4 at pleasure, makes it possible to turn the ball *a* in any chosen direction.

To understand best how this is accomplished, one should recall the geometrical principle of two lines perpendicular to

each other: two points on the one, at equal distance from the point of intersection, are equally distant from any point on the other.

The processes 5, 5 are by means of the bow *f* kept always equally distant from any point on the line (rod) *i*, and thus the axis-line of 4, 4 is always obliged to keep perpendicular to the line *i*; this is possible by the revolution of *e* between *c*, *c*.

When the apparatus is to be operated, the point 7, where *i*, *i* meet in front, is seized between thumb and forefinger and drawn in any direction until it occupies the position desired; when this is reached, one hand supports, while the other turns the screws *g*, *g* firmly in. The whole is then self-supporting.

So far the balls *a*, *a* have not been touched, but only the direction chosen and the axis *y* correctly placed.

On pushing back *k*, *k* the balls are ready to revolve around *y*, *y* into position, so that the rods *b*, *b* shall form respectively straight continuations of *i*, *i*.

The scales can then be read for the required data, the balls turned back to the primary position, the screws *g*, *g* freed, and any new point chosen; therefore only four movements into position and two reverse ones are necessary for each use of the apparatus. Three points it was proposed to accomplish:

1. Demonstration of Listing's law. This has been already indicated, inasmuch as the axis *y*, represented by the line of the processes 4, 4, always lies in the plane of the ring *e*, that is, in the equatorial plane of the eye.

2. The adjusting of the axis *y* to any chosen point of vision has been already explained; the measurement of its inclination is accomplished, as shown, by the pointer 6 of the ring *e* read on the scale *h*.

3. Donders' law. The vertical and the lateral angle of any revolution are coördinates and abscisses on a spherical surface, upon which the direct line from zero to the point reached, or that traversed by the end of the axis *x*, is part of a great circle. The lateral angle is measured on *o*, since the half-circle *n* and, consequently, the pointer 11 are in the same

vertical plane as *b*. The vertical angle is measured on the scale *n* by the pointer 10, since *n* always acts as a great circle and 10 retains a constant position.

The semicircle *n* with its continuation 8, while in the primary position, lies in the vertical median plane of the ball; if, however, the latter suffers a change from the vertical, during a partial revolution of *a*, it will no longer coincide with the plane of *n*. This divergence will be measured by the indicator 8 on the scale *m*, since the zero-line of *m* is always in the above-mentioned vertical median plane of the ball. The identifying of the result with that calculated by the known formula of Helmholtz, $\tan y = \frac{\sin B \sin L}{\cos L + \cos B}$, completes the proof.

The model from which the description has been taken was constructed with great patience and care by Herr E. Stöhrer, Leipsic. It can be modified in various ways without altering its essential principle.

For much assistance from Herr Dr. W. Schön, of Leipsic, so freely given in devising the instrument, I would acknowledge indebtedness.

ON A NEW FORM OF SCHEMATIC EYE.

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(*With one wood-cut.*)

IN the construction of this eye an attempt has been made to combine some of the advantages of the schematic eye of Listing as improved by Landolt with those of the artificial eye of Perrin. It is intended mainly for purposes of instruction and demonstration, but may also, though to a limited extent, be used for physiological and optical experiments.

The schematic eye consists essentially of a chamber, three centimetres in length, blackened within in order to absorb light. The complex dioptric system of the human eye, consisting as it does of various factors, possessing each its own index of refraction, and requiring separate consideration from an optical point of view, is here replaced by one bi-convex lens. This lens has a principal focal length of fifteen millimetres, and therefore represents, as nearly as possible, the total refraction of a normal emmetropic eye. Incident parallel rays passing through this lens are brought to a focus on a disc of ground glass which represents the retina. The lens itself is set in a metal frame, which is movable laterally, and which carries two other lenses. One of these has a refractive power of six dioptrics in excess of the preceding lens, and is intended to represent the optical condition of a normal eye during the act of accommodation. The third lens has a focal length of 30 millimetres and represents aphakia. Any one of these lenses can be brought into the axis of vision by a simple mechan-

ical arrangement. The retina, which, as already stated, consists of a plane disc of dimmed glass is fixed into a cylinder, which by means of a screw motion can either be approximated or removed from the lens. In emmetropia the artificial retina should lie at the distance of exactly fifteen millimetres behind the nodal point. The posterior half of the schematic eye, carrying the cylinder, rotates on its own axis, and by means of a coarse screw motion can be made either to increase or diminish the length of the antero-posterior axis. The number of dioptries of M. or H. thus produced can be read off by means of an index and gradu-

ated scale. The cylinder already mentioned is further provided with four discs. No 1 is an exact photographic reproduction, as regards size, of the image formed on the retina of a normal eye by the first three of Jäger's test types when seen from the distance of 30 centimetres. When the index is at zero or emmetropia, an emmetropic person should be able to read these characters with the ophthalmoscope in the upright image. But if any effort of accommodation has been made, a concave correcting lens will be required behind the mirror, and this lens will be a measure of the amount of accommodation which has been called

into play. In this way the estimation of the refraction by means of the ophthalmoscope can be easily practised. The same disc may also be used to demonstrate the theory of the inverted image, and to exemplify the changes produced in the retinal images by various conditions of ametropia. Disc No. 2 represents a glaucomatous cup having an excavation of 1 millimetre in depth; No. 3 represents a case of neuritis with swollen papilla; No. 4 a dial for the diagnosis of astigmatism reduced, photographically, 100 superficial diameters. These discs may be readily increased in number so as to include the chief pathological conditions of the fundus oculi.

On the anterior portion of the eye and in front of the crystalline lens is fixed a metal disc which carries 3+and 3—cylindrical lenses, and is also perforated with a simple stenopæic aperture. This disc is movable round its own axis, and also, as a whole, round a circle, the axis of which is the antero-posterior axis of the eye. By this arrangement any desired inclination can be given to the cylindrical lenses, and the phenomena of simple hypermetropic, myopic, and mixed astigmatism can be reproduced. A horizontal bar divided into centimetres passes through the stand on which the eye is fixed, and carries a lens holder adapted to the spherical and cylindrical glasses found in any ordinary trial case.

By means of this schematic eye the various phenomena of hypermetropia, myopia, and astigmatism, and the optical conditions on which they depend, can be readily demonstrated and made intelligible. The estimation of refraction by means of the ophthalmoscope can be self-taught. The scientific employment of glasses and their influence on the size of retinal images, as also the changes in refraction induced by any lengthening or shortening of the antero-posterior axis of an eye, can be shown. Accommodation is reproduced, precisely as in the living eye, by an alteration in the curvature, and thereby in the refractive power of the lens. By illuminating the schematic eye posteriorly, the optical law on which the theory of projection of retinal images depends, can be demonstrated, and their altered sizes

and shapes shown objectively, as also by calculation. The various phenomena attaching to aphakia, as also the influence of glasses upon the retinal images in that condition, amplitude of accommodation, ophthalmoscopic measurement in the direct and indirect images, and the value of various optometers and other instruments of precision, can be exemplified. For severe and exact physiological experiments, or for mathematical calculations, this eye is not primarily intended, and for such researches it cannot compare with the artificial eyes of Donders or Landolt. My object in its construction has been to combine simplicity and cheapness with an amount of accuracy sufficient to enable a teacher to demonstrate and a student to grasp quickly and easily the chief optical laws on which modern ophthalmology is founded. No schematic eye, be it ever so carefully and elaborately constructed, can exactly represent a normal human eye. No two natural eyes are identical in their optical properties, and, indeed, in speaking of a "normal eye" we speak of a concept the exact counterpart of which does not exist in nature. Every ophthalmic surgeon knows that however admirably adapted the human eye is, as a whole, to its various and multifarious functions, judged merely as an optical instrument it is full of the gravest defects. In this schematic eye I have, therefore, thought it well to abandon all attempts at extreme scientific accuracy, and rather to content myself with constructing an instrument capable of demonstrating in their simplest form the fundamental facts and laws of physiological optics. Hence, I have employed, instead of a fluid medium with the same index of refraction as the vitreous, a bi-convex lens with a considerably higher index, and consequently a shorter focal length. From a nodal point in a normal eye to the retina, the distance may be assumed theoretically to be fifteen millimetres, and this distance I have taken as the length of the principal focus of the lens which represents the crystalline. The resulting retinal images will approximate sufficiently in size to those of the real eye for all practical purposes of demonstration and self-instruction, while any optical calculations which can be

carried out at all, will be rendered much more simple and easy. This, indeed, is self-evident, inasmuch as instead of having to deal with four media, each of which possesses a distinct and independent optical value, we have only one, and that a constant and determinate quantity. I should mention that since exhibiting this schematic eye in the ophthalmological section of the British Medical Association last year, I have altered it in some important respects. It has been made for me by Messrs. Pickard & Curry, of 195 Great Portland Street, London, whom I have to thank for much patient and intelligent coöperation in carrying out and improving upon my original design.

OPHTHALMOLOGICAL ANOMALIES.

By P. D. KEYSER, M.D., Philadelphia, Pa.

(*With one wood-cut.*)

Congenital Dislocation of the Lens.—Ectopia Lentis.

THIS anomaly is found in both eyes and always symmetrical in the position of the dislocation. The greater number are misplaced upward, upward and outward, or upward and inward, very rarely are they found directly downward, and less so laterally, while in no instance, as far as I can learn, in the literature of ophthalmology, has any case been reported where the positions of the lenses in the eyes of a person having congenital dislocation were different, *i. e.*, not symmetrical.

Under this circumstance I feel that the following case will be as interesting to the profession as it has been to myself.

Dec. 16, 1879. My friend Dr. Fox, of Northampton Co., sent me Mr. H. V., æt. 26, for an examination of his eyes, as he has had great difficulty in seeing ever since his birth. I found the pupils somewhat contracted and the irides tremulous on the least movement of the eyeballs. Anterior chambers deeper than normal. Vision, either eye, $\frac{16}{LXX}$. No glass gave any amount of improvement. On examination with the ophthalmoscope, it was found that the lenses were dislocated, and the positions not symmetrical. That of the *R. E.* was directly inward, while that of the left was directly upward. This being so rare and remarkable a case I determined to make a thorough examination, to accomplish which I instilled a $\frac{1}{4}$-per-cent. solution of sulphate of duboisia in each eye several times, to get as complete an enlargement of

the pupils as possible. The pupils, after an hour's waiting, did not dilate ad maximum, but enough to give an excellent view of the lenses. The lenses were considerably reduced in size but perfectly transparent, and situated as first noted, the right one directly inward and the left directly upward. There was no persistent hyaloid artery to be seen in either eye. Neither was there any coloboma of the iris nor of the choroid present. The lenses were not movable to such a degree as to cause any change in the vision on holding the head in different positions.

The infrequency of the misplacement directly downward by spontaneous luxation after birth is such that justifies me in placing the following cases on record also.

May 25, 1881, Mrs. C. of this city brought her daughter, Miss Katie, a well-developed, healthy young lady of 19 years to me for examination of her eyes as she has had great difficulty all her life in seeing any thing either close at hand or at a distance. On looking at her eyes it was at once seen that the pupil of each was contracted to small pin-head sizes, and that it receded, giving the iris somewhat of a funnel shape, and making a deep anterior chamber. The irides were tremulous on every movement of the eyes. Vn. *R.* $\frac{4}{cc}$, *L.* $\frac{10}{cc}$. Ophthalmoscopic examination showed fundus normal, and hypermetropia of 12 D. There was not the least sign of a lens or capsule to be seen in either eye; and the mother denied that any operation for congenital cataract or any thing else had been performed on her eyes.

I instilled atropine to dilate the pupils, which only enlarged about $\frac{3}{4}$ the full standard, after which could be seen, only when the eyes were rolled very strongly downward, the lenses, quite small but transparent, lying entirely below the iris in the ciliary region. They were not in the least movable, and being completely out of the optic axis, could only be seen when the pupils were dilated and the eyes rolled downward.

I was able to improve her vision as follows:

R. with + 14 D = $\frac{20}{L}$, with + 18 D reads Jäger 5 at 12″.
L. with + 13 D = $\frac{20}{L}$, with + 18 D reads Jäger 4 at 12″.

On looking at the mother, I noticed that her pupils were very small and the irides also tremulous. Her history was, that she also had had trouble with her vision all her life; and on examina-

tion I found just the same defect as in her daughter. The lenses were dislocated directly downward, entirely out of the region of the pupil, reduced in size, but now opaque.

It appears from this that the daughter's case is one of inheritance. Mrs. C. has five children, and Miss Katie is the only one with defective vision.

A Case of Double Pupil.—Diplokoria.

Bessie McC., aged 26, came to my clinic, in the Wills Ophthalmic Hospital, May 27, 1879, complaining of defective sight in the *L. E.* On examination, I found that she had two individual and separate pupils. There was a broad band, 1½ *mm.* in width, running across from margin to margin of the iris, at an angle of 110°. The band was of the same thickness, color (bluish-gray), and continuous structure of the iris. It extended only from the extreme pupillary edges of the iris. The larger circle of the iris was perfect, not being touched by it. It had not the appearance of any of the persistent pupillary membranes that we have seen, or have been described. It might have passed more for a partial coloboma of the iris. On instillation of atropia in the eye, this band stretched considerably, while the outer edges of each pupil dilated freely. She had never suffered from any inflammation in the eye, nor were there any points of adhesion to the capsule to be found. The iris was perfectly free and movable at every place, except where held in check by this band.

Of the congenital anomalies of the iris, that of more than one pupil is one of the rarest. In former times, before the discovery of the ophthalmoscope, cases of such have been described, which, no doubt, have been either traumatic or very black spots, supposed to be pupils, or persistent pupillary membranes springing from the larger circle of the iris across the pupillary region, forming the so-called bridge coloboma. Wardrop described several cases; Carron du Villard wrote of one with three pupils (Triplokoria); Desmarres, Sr., saw a child with two, in which the one was in the upper part of the iris, and was covered by the upper lid. (No doubt this was a detachment of the iris from its ciliary border, of traumatic origin,—Iridodialysis.) Von Ammon

describes two cases in his atlas. In one there was a triangular opening in the iris below the normal pupil; in the other there were three openings in the centre of the iris, the two upper being small fissures, and the lowest one double the size and perfectly round.

These are the only descriptions of duplicate or triplicate pupils in an eye that I can find. Manz thinks that when such are found they are mostly formed by a bridge across a coloboma of the iris. In such cases the pupils or openings are irregular in form, and unequal in size. In the case above described, the band was very large, thick, and firm, and the pupils very nearly of a size. See the figure.

I determined to remove this band, if possible, by operative influence, and succeeded as follows:

A small incision was made through the cornea in the lower and inner quadrant, through which a delicate pair of iris forceps were introduced and passed up in the anterior chamber to the upper line of the pupillary margin and attachment of the band, where it was grasped in its whole breadth and pulled down and out of the incision, when it was carefully cut through. Then it was cut from the lower edge of the iris, after which the protruding iris was replaced from the corneal incision, and a solution of pilocarpine instilled into the eye. There was no inflammation of the iris after the operation; the pupil became perfectly round as in the normal condition, and the action of the iris has been good ever since. The ophthalmoscopic examination showed no coloboma of the choroid.

SYMPATHETIC OPHTHALMIA. TWO CASES UNDER PECULIAR CIRCUMSTANCES. SEQUEL OF SURGICAL OPERATIONS.

By JULIAN J. CHISOLM, M.D., Baltimore.

SYMPATHETIC ophthalmia, so common after a certain class of eye accidents, seldom appears as a sequel to well-devised operations, and yet there are exceptions to even this well-established rule. Every ophthalmic surgeon of large experience will now and then have such cases in his list of accidents. During the past year the records of the Presbyterian Eye and Ear Hospital of Baltimore show two such cases, both occurring under peculiar circumstances, especially one of them, which gave this curious list of diseases and operations, in the order of their occurrence. First, zonal cataracts, for which large internal iridectomies had been performed eight years since; 16 months since, successful cataract extraction in left eye, with perfect restoration of vision; 10 months since, violent attack of glaucoma in right eye, cataract extraction with prompt relief; 8 months since, general cystoid expansion of cicatrix in right eye, with severe pain in both, and iritis in left eye, neurotomy of right with prompt arrest of pain in each eye; 1 month since, iridectomy in left eye for the restoration of sight, seriously impaired by the sympathetic iritis. The second was a case of destructive glaucoma in left eye, iridectomy for relief of pain, followed in 10 weeks by sympathetic iritis in right eye. Pain in both promptly checked by neurotomy of the lost eye.

Mrs. S., aged 59, in good health, had never had perfect eyesight. She was called near-sighted. She could see very well fine print, provided the book was held in such a way as would permit some dilatation of the pupil by shading. The nucleus of opacity, which was central and at first very small, slowly increased, until at the age of 50 useful vision had nearly departed. At that time a large inner iridectomy was performed on each eye with excellent results. With the exposed rim of clear lens substance she could see very well to attend to household duties. Slowly the area of lens clouding increased, until the cataract in each eye became complete.

At the age of fifty-seven she had the cataract from the left eye removed at the site of the former large iridectomy. The operation of extraction with peripheral cystotomy was a smooth one, and the subsequent treatment was equally satisfactory. At the end of two weeks she went home, with eye nearly free of all redness. The operation was performed under chloroform, and she had not a single paroxysm of pain during the healing and convalescence. Such good sight was restored to this eye that she became independent of the right eye, in which a mature cataract also existed, with a large iridectomy cleanly cut to the very ciliary border.

Six months to the day from the period of cataract extraction, she returned to the hospital suffering intense pain in the eye which had not been operated on. She had been suffering for two weeks. The eye was injected, cornea a little hazy, tension + 3, with all symptoms of acute inflammatory glaucoma, notwithstanding the existence of the very large iridectomy. To obtain relief from pain she submitted to the extraction of the lens, which was very successfully removed, through the old iridectomy. Relief in this instance was prompt, and in her anxiety to get to her home, she left the hospital at the end of twelve days with the former good sight of the left eye and perfect comfort in the right or glaucomatous one, although no sight had been gained in this eye by the cataract extraction at the time of leaving the hospital.

Nov. 30, 1880.—Two months since the last operation she again came to the hospital. On this occasion she was suffering with both eyes, and had been so for several days. The pain in the right or glaucomatous eye was severe and of longest duration. With the pain which she had suffered for one week in the left or good eye, there was also decided impairment of

vision. It was chiefly for the defect in sight of this good eye that she sought surgical aid. In the right eye I found that the entire cicatrix in the corneal border had yielded, and was in a bulbous or cystoid condition. In this eye there were clouding of the cornea, much general congestion, and no perception of light. She had suffered very severely in this lost eye. In the left eye, in which the pain had not been marked, there was very decided shrinking of what had formerly been a bold artificial pupil. There was also some clouding of cornea, corresponding to this pupillary region. Adhesions were abundant, and the pupil could not be influenced by atropia. She could no longer trust herself in the street on account of the rapid diminution of sight in the left eye. A neurotomy was determined upon for the lost and painful eye. Under chloroform the optic and ciliary nerves were all divided through a horizontal opening in the conjunctiva, between the inner and lower rectus muscles. After the operation bleeding was free, and ecchymosis of both conjunctiva and lids was extensive, but there was no marked protrusion of the eyeball. Relief from pain was prompt and proved permanent in both eyes.

July 19, 1881.—To-day she entered the hospital to have an artificial pupil made in the eye, in which some little sight is retained. Seven months have now elapsed since the optico-ciliary neurotomy. There has been no return of pain in either eye. *In the right eye upon which the nerve-cutting was effected there has been a complete effacing of the corneal staphyloma.*

At what period of the convalescence the projection of the cystoid cicatrix commenced to level down had not been observed. The patient had been at her home, out of the city, and had not been seen by any physician. In the left eye, the one in which good sight had been restored after cataract extraction, the pupil is so far closed as to necessitate an artificial pupil outwardly to escape the corneal clouding, which corresponds to the site of the old iridectomy on the nasal half of the cornea.

The second case, which, singular to say, was an inmate of the hospital at the same time with the one above reported, was Mr. L., aged 60, who, prior to admission, Sept. 14, 1880, had been suffering severely with his left eye for one month. He

had lost even appreciation of light in this eye when first examined by me. The eye was much injected, with tension + 3. The cornea was so hazy and vitreous so muddy that even a good fundus reflex could not be obtained. The expression of his face bore evidences of severe suffering. Under chloroform, an iridectomy was performed, which brought prompt relief from pain. He left the hospital in two weeks. The left eye was still injected, but there was no pain whatever.

Nov. 26, 1880.—Ten weeks after the iridectomy he returned to the hospital, suffering with inflammation of both eyes. His left eye was highly congested, with + tension. In the right eye which had been implicated only a few days, there was a shrinkage of the pupil, with such firm adhesions to the capsule that atropia could effect no dilatation. It was deemed expedient to perform opticociliary neurotomy on the lost and painful eye, to put an end to the suffering, with the hope that it might influence beneficially the eye in which sympathetic iritis had been established. After the neurotomy, which was performed in the intermuscular space inward and downward, there was a good deal of exophthalmus from blood extravasation behind the eyeball. Prompt relief was given from the pain.

The patient was examined eight months after the neurotomy. There had been no return of pain in either eye, nor had there been any new accession of iritis. The weather now being very hot he is awaiting the approach of autumn before having the closed pupil opened by an iridectomy, with hopes of improved vision.

CONTRIBUTIONS TO THE KNOWLEDGE OF NEW FORMATIONS IN THE EYE.

By WILLIAM C. AYRES, M.D., of New York.

I.—*Sarcoma of the Choroid.*

(*With plate vi* b)

IN opening an eye which had been injured and enucleated on account of sympathetic irritation, the knife passed through a small round melanotic tumor about the size of a pin's head, in the region of the choroid. It was situated near the inner side of the choroidal tissue, and about midway between the ora serrata and the papilla. In examining it further, it showed itself to be a melanotic sarcoma of the choroid with some peculiarities worthy of notice.

The tumor itself was made up of three small spherical bodies, consisting of round and spindle-shaped cells, darkly pigmented. In the centre the cells were large and round, with irregular contours, as is usually the case in young sarcomata, and were colored with a pigment which resembled that of the choroid. Each one of these spheroids was surrounded by a zone of new-formed connective tissue, with long spindle-shaped cells, in which the pigment was scarce, but still of the same color as that of the uveal tract. These cells frequently had only a few dark spots in them, as if the pigmentation had just commenced, but showed no characteristic difference from the ordinary type of new-formed connective tissue.

As far as the tumor itself was concerned, but little could be said as to the tissue from which it had taken its origin; but at a little distance from the three spheroids were

smaller nests which showed this origin plainly. These smaller nests were made up of two kinds of cells, viz., in the middle were large round or oval cells, with nuclei, while running concentrically around them were spindle cells with nuclei of connective tissue. The whole gave the impression that they were sections of blood-vessels with considerably thickened wall. Those next to the tumor were solid, the interior being filled with the cells already described, while the outer parts were probably the adventitia in a state of considerable hypertrophy. Sometimes these nests, when near the tumor, were pigmented, but when further away they were free from pigment or contained only a few dark spots. In them was no sign of a lumen, so that from them alone we could not say with certainty whether they were sections of blood-vessels or not.

A little further away were other nests which presented precisely the same conditions, with the exception that there was in the centre a lumen which contained red blood corpuscles. They had, in the interior, the same cells, though not in sufficient numbers to obliterate the lumen; the adventitia was also hypertrophied, but contained no pigment. The cells in the centre were not tightly packed together, and plainly showed they were undergoing a process of proliferation by division. For instance, we find a cell with a constriction in its nucleus; another with two nuclei; another with four, each one of these having a nucleolus. The mother cell sometimes showed a line of division which ran just between the nuclei. In a few instances we could find cells with 7–8 nuclei (giant cells). Again, in a favorable locality we could notice a cell which looked puffy; in it were two distinct nuclei which had separated somewhat from each other, the mother cell having a line across it just between them. The cell body had already divided along this line through about two thirds of its extent, but hung together by the remaining third. Comparing the solid figures with similar ones with red blood corpuscles in the centre, and where the lumen was smaller but not entirely obliterated, we are justified in supposing that they are both cross-sections of blood-vessels. The solid figures were for

the most part slightly pigmented, while the hollow ones were pigment-free.

There were other peculiar bodies in the immediate vicinity of the tumor, the nature of which could not be determined with so much certainty. They were all ovals of various lengths and thicknesses, and greatly resembled longitudinal sections of blood-vessels which had become slightly tortuous, and consequently running only a short distance in the plane of the sections. They all ran parallel to the surface of the choroid and occupied the region of the blood-vessels exclusively, and especially the region of the chorio-capillaris. The walls of these figures were made up of the same peculiar round or ovoid cells that were found in the centres of the round clusters, and just in the centre of each one of them was a slit, very sharply defined, as if it had been cut with a knife. No blood-corpuscles were present in these fissures, and we may conclude that they were first closed and then opened in the hardening process. It is, however, peculiar that we do not find a fissure in any of the round clusters, where they are solid, although they, too, had been subjected to the same hardening influence.

The oblong fissures bore a slight resemblance to cartilage, but I am inclined to consider them portions of tortuous vessels which have been cut off. If so, they are changed; first, by a new formation of cells, and a consequent thickening of the adventitia of the vessels; second, by an increase in the endothelial cells of the vessels; and third, by the absorption of pigment in degrees varying in different localities. Cross-sections of blood-vessels which were easily recognized as such showed that their walls had undergone a metamorphosis which tended to produce figures similar to the new formation, with the exception of the fissures. I am therefore at a loss to consider the nests as any thing but blood-vessels, whose walls have been changed in a similar way. The three spheroids of the tumor itself were composed of these oblong figures. Although the pigment was present in the interior in such quantities as to conceal the true shape of the cells, I could notice the

same fissures in the centre of all three of them. They ran in different directions, plainly showing the tumor was built up of a number of these clusters which had absorbed so much pigment as to appear dark brown or almost black.

The round and oval bodies were more numerous in the immediate vicinity of the tumor, and here they contained pigment; at a greater distance from the tumor they were less numerous, and were free from pigment.

The remainder of the choroid was entirely normal, not even congested to any remarkable extent. There was, however, one peculiarity in the pigment corpuscles, which is sometimes noticed in eyes without tumors, viz.: in the immediate vicinity of the tumor they seem to have lost most of their pigment, and the whole protoplasm was collected into small shining globules, which refracted light strongly. This condition I did not find at a distance from the tumor. Whether it has any relation to the corpuscles giving up their pigment to the tumor is, of course, a question. Just so far, however, as there is an increase of pigment in the tumor, there is a loss of it in the corpuscles.

The tumor itself has all the characteristics of a young sarcoma melanoticum, and we find distinct evidences of an active proliferation of cells by division, and great thickening of the walls of the blood-vessels, sometimes amounting to 7–8 rows of cells. In some instances these new cells form solid nests; in others, similar figures, which have lumens containing red blood corpuscles.

Again, there are figures which must be taken for longitudinal sections of blood-vessels, since they only occur in the region of the vessels of the choroid. Near the tumor both round and elliptical figures are pigmented, whereas at some distance away they are free. Since we find in the centres of the sarcoma nodules the same fissures which are in the longitudinal sections of the blood-vessels (although the pigment in those nodules has completely filled the cells so that we can see no nuclei), we are justified in considering the tumor nodule, the round and oval nests, as having the same origin. The pigmented nodules are surrounded by new-

formed connective tissue, as are also the smaller nests. It is therefore probable that the tumor is a small melanotic sarcoma of the choroid, which has been produced by a proliferation of the adventitia and perivascular connective tissue, just as we find the tissue of the blood-vessels implicated in the formation of glioma retinæ, as described by Hirschberg[1] and others.

II.—*Gliomatous Infiltration of the Lens.*

In reporting the case of glioma retinæ endophytum in these ARCHIVES, vol. ix, No. 2, I failed to examine the lens, since no opacity was noticed in it during life. On the contrary, all the media were clear, so that the retinal tumor could be distinctly seen and easily diagnosticated.

My attention was naturally drawn more closely to the retina and optic nerve, but on looking at the eye some time after I noticed a peculiar whitish zone near the capsule of the lens.

In it we discover a condition which is peculiarly interesting. The glioma cells had made their way along one side of the ciliary body, and had passed both without and within the canal of Petit, along the whole length of the suspensory ligament up to the lens capsule. When outside of the ligament they seemed to have impinged upon the capsule and passed around it. When within they seemed to have passed directly to the lens, and to have forced themselves up beneath the fibres of the ligament, as they attached themselves to the anterior capsule. Though they had not disturbed the continuity of the capsule at any other place, just under the attachment they had broken through and entered the body of the lens. (See fig. 5, plate vi b.)

They had also entered into the body of the capsule itself and split it into distinct layers to a distance of some mm. from the capsular rent. (See fig. 5.)

When once within the lens body they also behaved in a peculiar manner. Those which worked themselves toward the anterior pole seemed to have merely glanced over the

[1] Hirschberg, "Malignant Tumors of the Retina." These ARCHIVES, vol. x, No. 1, March, 1881.

lens fibres, and separated the anterior capsule and epithelium from the anterior cortex. Between these we therefore find a zone of glioma cells, whereas there are none between the lens fibres.

Those which made their way backward did not follow the capsule, but pushed in between the individual lens fibres, dissecting them apart, and we therefore find that the entire formative zone of the lens is free, and in normal apposition of fibres, epithelial cells, and capsule.

The zone of cortex which is pervaded by the glioma cells corresponds about to the place where the fibres have an "S" shape in the embryo. This entire zone is more or less destroyed. The whole condition must have been of very recent date, since the fibres of the lens are well preserved, except that there are large drops of a homogeneous fluid on the lens, which have been forced out of place by the entrance of the glioma cells.

Another fact, besides the transparency of the lens, speaks for quite a recent date of entrance, viz., the condition of the epithelium of the anterior capsule. These cells were not of their normal shape, but were still recognizable as regular cells. I remember, while studying the processes which go on in a fresh lens from one minute after removal up to several hours, observing it in a warm chamber, under the microscope, that when first seen the epithelial cells and cement substance were so clear and homogenous that we could not distinguish them. After a time the cement became granular, and the contours of the cells visible. The cement became fluid in a few hours, when the cells began to change their shape, and the nuclei to travel slowly about within the cell body. The body itself would put out little nodules, and then withdraw them, and the whole cell move slowly about like a wandering cell in the cornea. At the end of thirty-six hours they would be much more disfigured than the epithelium of this lens, though, of course, while the eye is in the living animal there may be processes which resist a rapid change. At any rate, the epithelium of this lens makes the impression that it has been disturbed only for a short time.

This specimen is interesting when taken in connection with another case I will here describe:

Bone within the Lens Capsule.[1]

The specimen had been preserved in dilute chromic acid for some time, and was phthisical. I noticed, however, that it was more so in its posterior than in its anterior half. When cut open the lens was of its normal size, but of a peculiar texture, the remainder of the eye being shrunken considerably. Examining it with the microscope, I found that the whole cortex had been removed, and the space within the capsule filled by true bony tissue, having a perfect system of canals and typical bone corpuscles, with the exception of a narrow zone of connective tissue, holding the same relative position as the glioma cells in the case of gliomatous infiltration. The ossification had taken place in layers more or less parallel to this zone of new formations.

The lens capsule had about its normal curvature both behind and in front, and was perfectly smooth except one small fold near the place of attachment of the suspensory ligament to the anterior surface. The break had also occurred in the same locality.

As before remarked, the ossification had taken place in layers parallel to the connective tissue next to the capsule, and where these layers of bone were thin, it appeared as if the original fibres had ossified, but of course this is impossible, since the lens, being epithelial tissue, cannot ossify.

The specimen is a valuable one on account of the full size of the lens, and the normal curvature of its capsule, while at the same time the body of the lens is entirely replaced by bone. Besides this osseous tissue there were no bone corpuscles in the remainder of the eye, as I cut the choroid in all possible directions to find bone, but failed to do so.

There was no history of an injury to the eye, it having become phthisical after a severe inflammation in childhood.

[1] This eye was sent to me by my stepfather, Dr. B. A. Pope, of New Orleans, and I hereby return him my thanks for it.

I have examined another specimen of a lens, which presented the same condition of connective tissue in this zone of new formations, but interior to it were colloid bodies much resembling those from the choroid. I could not find a hole in the capsule at the place at which the glioma cells and the material for the bone seem to have forced an entrance, but the shape of the new tissue was the same, indicating an analogous method of formation.

The evidence is that any wandering material or bodies would impinge upon the capsule, and where there was no structure to lodge them, would slide over its convex surface, and have no effect upon it. If, on the contrary, they found a tissue under which they could migrate, like the suspensory ligament, they would have a support against which they could react, and then expend their whole energy directly upon the tissue of the capsule. In this way they would be enabled to force a passage through it into the substance of the lens body, and by further changes produce the various materials which constitute the chapter of new formations within the lens.

CONTRIBUTIONS TO THE PATHOLOGY OF SYMPATHETIC INFLAMMATION.

By WILLIAM C. AYRES, M.D., of New York.

(*With plate vi* b.)

I AM fully aware that in publishing the following examination of a series of eyes which have been enucleated on account of sympathetic inflammation, the results are somewhat at variance with the experience of most investigators, but nevertheless they show some points so peculiar and interesting as perhaps to warrant their publication. The material, both anatomical and clinical, has been collected in Dr. Knapp's clinic.

In most of the cases there are conditions which at a future time may help to throw light on the etiology of sympathetic ophthalmia. It is not my purpose to comment on the existing theories of transmission, but simply to record the facts, and let them speak for themselves.

Case 1.—*Irido-choroiditis traumatica. Sympathetic cyclitis.* The size of the globe was normal. No detachment of the retina. Aphakia from trauma. The papilla and the optic nerve were slightly swollen and infiltrated with small round cells, showing that there was a certain amount of neuro-retinitis. The endothelial cells of the lymph-spaces in the optic nerve were remarkably transparent, enlarged, and granular, showing that they also were not in their normal condition; the interstitial connective tissue was increased, and the nerve-fibres were smaller than normal. The blood-vessels were healthy, or had their walls slightly

thickened. The perivascular lymph-tracts had quite a number of lymph-bodies in them. Within the capillaries of the nerve there were large, round, granular bodies which were transparent, resembling amyloid, but their exact nature I did not determine since I did not wish to disturb the specimen. There was also an increase in vessels at the papilla, but they did not contain the bodies just referred to.

The intervaginal lymph-space had satisfactory signs of a pathological process.

The choroid was congested, and an increase in the number of lymph-corpuscles was probably, though not much, above the normal limit.

The *ciliary nerves* presented many peculiarities easy of observation. In the first place, the long nerve itself was larger than usually, and its individual fibres were not so densely packed together as we find them in normal eyes. The contours of the individual nerve-fibres were sometimes very irregular, presenting a serrated condition, as if they had been hacked at regular intervals and an actual loss of substance in the nerve-fibres had taken place, sometimes involving the axis cylinder. Along the nerve the *nuclei of the interfibrillar tissue were large, round, and granular.* (See fig. 1, plate vi b.) The nerve-fibres were larger, and the myeline frequently gathered into round globules within the sheath. At a few places where the medullary substance was thus formed into globules, parts of the axis cylinders ran through and were striated in their longitudinal direction. Near the ciliary body some of the fibres had so many globules of myeline in them, that they presented the appearance of a string of large beads (as in fig 2). I could trace the nerves up to the ciliary muscle, but could not follow them into it, or find out any thing as to their terminations in the muscle, but the same condition of globulated myeline in the fibres I could see as far as I could find the nerve.

These nerve-fibres were, many of them, in a pathological condition, though not near so much so as in some other specimens I have examined and will later relate.[1]

[1] In this connection I would like to state that in examining the ciliary nerves and their individual nerve-fibres, I found in several places that where a single nerve-fibre had been detached or was at any rate isolated from the bundle, it

The nuclei of the interfibrillar tissue of the ciliary nerves were often round and granular, and followed each other in quick succession as if there were a considerable increase in their number, although I could not see any evidences of an actual proliferation.

CASE 2.—*Phthisis anterior traumatica. Sympathetic neuro-retinitis* was the diagnosis in the clinical record of the institution.

The anterior part of the globe confirmed the diagnosis. The ciliary body was also atrophied. The retina was detached, but there were signs of a well-defined neuro-retinitis. The intervaginal space showed no marked complication, at least near the globe, but unfortunately the optic nerve was cut off too close to the eye.

The ciliary nerves were smaller than normal, but the individual fibrillæ gave the axis cylinders distinctly to be seen. The interfibrillar tissue was gone in some places, and in others were found myeline drops along the course of the fibres. The nuclei were very prominent, large, and granular. Sometimes we found a whole area converted into mere strings of connective tissue. The ciliary nerves were undoubtedly pathological, although the diagnosis was only sympathetic neuro-retinitis.

CASE 3.—*Injury in the ciliary region. Irido-cyclitis traumatica. Sympathetic ophthalmia* was again the recorded diagnosis.

In the optic nerve and the retina I did not find the slightest evidence of an inflammatory process, nor was there any thing in the intervaginal space which could lead to a suspicion of abnormity, at least as far as a microscopic examination was concerned.

In this eye there was a spongy exudation in the choroid. The ciliary nerve-fibres were smaller, but since the eye had

seemed to send offshoots into the pigment corpuscles of the choroid (see fig. 4). At least they had the same shape as these corpuscles, although they contained but little pigment and showed no characteristic of ganglion cells. The nerve-fibres had an enlargement in which was a nucleus; then it branched, and each branch went to such a pale corpuscle. Often it had several branches, all of which went to such corpuscles; sometimes two of them going to the same after having taken entirely different routes to reach it. I found also distinct terminations in or connections of the corneal nerves with the corneal corpuscles in specimens stained with chloride of gold.

been first in Müller's fluid and then for some time in alcohol, the diminution may have been the natural shrinkage due to the latter reagent.

Along the nerve-fibres there was an accumulation of small round cells, and also collections in the choroid, giving evidence of an acute plastic choroiditis. The spongy exudation had contracted and had encircled the nerve-bundles and pressed them to a considerable degree. The myeline was formed into globules in some of the fibres. The nuclei of the interfibrillar tissue were large, rounder than they should be, and granular. *They were not so numerous as in the normal nerve.*

The ciliary body was atrophied and drawn toward the centre of the eye, so as to separate it from the sclerotic. I could not find that any nerves had been divided by the wound, but could see that there were a few small bundles stretching from the inner surface of the sclera to the ciliary muscle, which must have been under a state of tension.

The ciliary nerves were infiltrated with lymph-cells along the whole length of their course; the nuclei were large and granular; there was a spongy exudation through which they ran, and some of them (the smaller branches at the ciliary body) were probably under a tension brought about by the detachment of the ciliary body inward. I found that the nerve-fibres were smaller and had large accumulations of myeline drops within them. Sometimes the axis cylinders were bare in places. These drops did not look like those found in normal nerves which had been hardened.

CASE 4.—*Irido-choroiditis purulenta traumatica. Sympathetic iritis plastica.*

In this eye also the microscope confirmed the diagnosis as far as the first part of it is concerned. The iris, choroid, and ciliary body were densely infiltrated with small round cells. In the iris they were beautifully arranged along the walls of the blood-vessels in the perivascular tissue. The choroid was of about 2–3 times its normal thickness. The retina and optic nerve were remarkably normal for such an eye, having only a very slight round-cell infiltration, and even this was questionable. In a thin section, well colored,

and put up in glycerine, I could see only a slight infiltration of the retina and papilla.

In the optic nerve it was very doubtful, while in the intervaginal and perivascular lymph-spaces there were no round cells to be found.

The ciliary nerves were in a remarkable condition. They were soft and easily broken up, so that pieces of them became detached from the nerve-tract. The interfibrillar tissue was scant, and I did not find a single nucleus. The whole nerve was densely infiltrated with round cells. This infiltration was accumulated along the nerve-tract, and also extended into the nerve-bundles so as to run between the individual nerve-fibres (see fig. 2, plate vi *b*). The nerve-fibres had large nodules in them, sometimes to one side and sometimes on both symmetrically. Whereas the infiltration of the nerve-bundles was dense, I could not find a single place where the fibres in the middle of the tract were not continuous, that is, they were nowhere broken entirely; the process had not gone so far. Only the outer fibres were broken up as before described. In those parts where the fibres were not broken into bits, I found the nuclei of the interfibrillar tissue, but they were very large, granular, and puffy. The nerve-fibres had a peculiar bluish color, as did also some isolated drops of myeline which were scattered along the nerve among the round cells, but by their color they were easily distinguished from the latter, though frequently of the same size. Occasionally I saw a large drop of myeline with a line across it, as if it were undergoing a process of division. Sometimes there were small clusters of these drops, as I could count one large and many smaller ones in its immediate vicinity. The nerve-fibrillæ frequently had large nodules on their sides, and some of them presented the beaded appearance noted in other cases.

In the ciliary body there was a dense infiltration, and the muscle-fibres were separated from one another, especially at the outer side. I could trace some of the nerve-fibres to the muscle, and could follow them into it, where I could see them present the condition which I have described above.

I found quite a large nerve passing into the sclerotic just at the ciliary body, and its interstitial tissue was also infiltrated, and in the canal through which it was taking its course (probably to the cornea) there was a great collection of small round cells which must have pressed the nerve considerably.

CASE 5.—*Irido-cyclitis traumatica. Sympathetic irritation.* The eye was slightly atrophic. The lens was swollen and the iris pushed forward against the cornea, obliterating the anterior chamber. The retina was detached and hung to the papilla and ora serrata stretching behind the lens. It was degenerated to connective tissue, but contained a considerable amount of small round cells. The choroid was hyperæmic and also infiltrated, but in isolated patches, as if there were an acute plastic choroiditis under way. The papilla and optic nerve were infiltrated as far as the stump extended, but more so at the proximal than at the distal end. The intervaginal space contained a few round cells, and the fibres of the arachnoidal sheath were considerably swollen. Along the sides of these fibres there were strings of nuclei, very large and granular. The optic nerve was atrophied to about one half its natural size.

The ciliary body seemed to be thickened, but on closer inspection it was the result of its being pulled inward by a cicatricial contraction of a band of connective tissue extending from it through the vitreous behind the lens. The individual bundles of muscle-fibres were separated from each other so as to form free spaces between them. The ciliary muscle and the iris were infiltrated with round cells.

The ciliary nerve-fibres were brittle and broke off easily, and the myeline was almost as much globulated as I have found it in the case of sympathetic plastic cyclitis. Some of the fibres were twice or three times as thick as they usually are, the nuclei of the interfibrillar tissue being thicker than the fibres, and thoroughly granular. There were also bodies of myeline in the nerve-fibres, larger than a white blood corpuscle. The nuclei of the inter-fibrillar tissue were sometimes perfectly round when they were unusually large. In places I found a string of these nuclei hanging together

by a delicate thread of tissue, when only the outer sheath of the nerve-fibre was visible in the vicinity. When a nucleus was very large the axis cylinder and the whole fibre were bent around it, forming, sometimes, a complete half circle. There were small round cells along the course of the nerve, but I could not find them between the nerve-fibres.

At a certain part, the nerve-fibres were smaller, and the nuclei of the interfibrillar tissue much larger and more numerous, so that the whole mass was composed of about $\frac{2}{3}$ nuclei and $\frac{1}{3}$ nerve-tissue.

In other localities whole segments of the nerve-fibre presented the appearance of a string of beads, and where a nerve-fibre had been broken I found a globule hanging from its end, so that it must have been fluid at the time of preparation. In several places I found fibres swollen to four or five times their natural size, and within these swollen parts were numerous shining globules. Just in this place I could count 14 large granular nuclei along one fibre within the field of the microscope (Hartnack 7 oc. 3).

That this nerve was undergoing a pathological process can hardly be doubted, nevertheless the diagnosis was simply *sympathetic irritation.*

CASE 6.—*Ulcerous scar of the cornea. Sympathetic irritation.*

The eye was smaller than normal, at least its anterior part, and the condition of the cornea justified the diagnosis. The iris was lying in the wound, the lens had been absorbed, and the wrinkled capsule remained. The iris was densely infiltrated with round cells, which were especially accumulated along the blood-vessels, in the perivascular tissue. *In the iris I found a tubercle* which ran through its whole thickness, near the bottom, containing the pigment of the posterior surface.

The head of the ciliary body was also infiltrated. It was detached, and between it and the sclera was an amorphous granular mass, which was also found in the choroid posteriorly.

There was a plastic exudation behind the lens which was undergoing cicatricial contraction.

The ciliary nerves presented a most peculiar appearance. They were remarkably clear and transparent, and were of a bluish gray color. They had but few nuclei and these were unusually long and slender. The nerve-fibres were frequently swollen into pear-shaped enlargements, five or six times the size of the fibre itself. These were sometimes symmetrical on both sides of the axis cylinder, but frequently only on one side. In the nodules were also the peculiar round shining drops.

In this eye the retina was not detached, nor did I find any conclusive evidence of abnormity in it, or in the optic nerve; nor was there any in the intervaginal space.

CASE 7.—*Irido-cyclitis purulenta. Gun-cap in eye.*

No sympathy had manifested itself.

The iris, ciliary body, and choroid showed the conditions usually present in panophthalmitis, *i. e.*, dense infiltration with small round cells. The ciliary nerves were interstitially infiltrated, and also a large number of the small cells were accumulated along the course of the nerve. The nerve-fibrillæ were denuded of their interfibrillar tissue and the nuclei along their walls. They had club-shaped nodules upon them, and more frequently than I saw them in any eye examined. I might say that every one of them had many such swellings, as in transparent places where I could count 40–50 fibrillæ, every one showed the swellings distinctly (see fig. 3, plate vi *b*). This accumulation of round cells was very abundant along the course of the nerve, and frequently so great as to destroy it completely. (Figure 3 was drawn from such a place.) Every bundle which I examined showed these defects, and whereas the nerve in itself was more pathological than any I examined, we can readily account for the fact that sympathy did not demonstrate itself—if it is transmitted by the ciliary nerve,—since all the nerves were probably destroyed in some part of their course, by the purulent process. We may say that the nerve was actually undergoing suppuration.

CASE 8.—*Irido-cyclitis traumatica oc. sin. Sympathetic irritation.*

In this eye there was a total detachment of the retina;

its tissue, which had lost all of its characteristics, still contained small round cells, which were, in many places at least, the remains of the retinal granules, since they still had a definite arrangement. The optic nerve was atrophied, but did not show any signs of an inflammatory process. The lymph-spaces were free, and also the perivascular tissue. Therefore, if there had been a pre-existing neuro-retinitis, at present we could not diagnosticate it with certainty.

The tissue of the iris was infiltrated with small round cells, as was also that of the ciliary body and choroid. The ciliary body was detached by a homogeneous mass, within which were many ciliary nerves.

The ciliary nerves, both large and small, showed an increase in their interfibrillar connective tissue, so that I could easily seize the smallest portion, and strip it off from the body of the nerves through its entire length. The nuclei were long and slender, but did not seem to be present in greater numbers than in the normal nerve. The nerve-fibres themselves were brittle, and when isolated from the connective tissue, were easily broken up, presenting large swellings on their bodies, which did not seem to be of the same constitution as the myeline, since they were all more or less colored a pale yellow. In some places I could see these straw-colored bodies, twice as large as the whole nerve-fibre, lying between the outer contour of the fibre and the axis cylinder, pushing the latter to one side, and greatly reducing its diameter. In what they consist, it is difficult to say, but a condition certainly obtained which does not bear any resemblance to the normal state of the nerve-fibres. At more or less regular intervals, I could see the globules of myeline arranged in strings, but not following each other in quick succession; also the nodular enlargements on the sides of the nerve-fibres (as is represented in fig. 3).

I could not find an infiltration of the nerve-bundles, as was so evident in Case 4, where the whole nerve-tract had rows of small round cells between its fibres along their entire length, from the ciliary body to their exit from the globe.

In all of these eyes it was easy to distinguish between

the two kinds of nerve-fibres in the choroid, viz., the light transparent and the darker variety, but both showed the above conditions alike.

I have examined several other eyes, but they did not furnish evidence sufficiently striking to be trusted. Sometimes I could not find the least sign of abnormity in the ciliary nerves, and in one instance none in the ciliary nor optic nerves. In this last case I am inclined to doubt the correctness of the diagnosis, or at least will say that the microscopic examination failed to confirm it.

Remarks.—In examining the ciliary nerves of normal eyes, which had been subjected to the same hardening process as those which had caused sympathy from pathological processes in themselves, I have always found a more or less definite ratio between the number of nerve-fibres and the nuclei of their interfibrillar substance. The fibres may also show many irregularities in their course, independent of the constrictions in the medullary substance, such as swellings, indentations, and a granular condition in the interior. At rare intervals, furthermore, drops of myeline may be found, somewhat similar in character to those which are undergoing a pathological change, but I have never found them so large as to cause any distortion in the contours of the normal nerve. The course of the nerve-fibres may be irregular, or even tortuous, and there is no evidence of an inflammatory change to be derived from such nerves in an inflamed eye. Nevertheless, in the foregoing cases, there are constant irregularities in the shapes and conditions of the fibre, which certainly deserve to be considered pathological changes. One of the most frequent changes I have found to be in the irregularity, size, and number of the nuclei in the interfibrillar connective tissue.

I have faithfully, though briefly, recorded the conditions found in the above cases, and frequently such observations as "the nerve is larger, or the individual fibres are not so densely packed together," may be noticed, but I do not attach any great importance to these observations, since the conditions may or may not have been caused by some extraneous circumstances, as hardening, methods of prepara-

tion, etc., but, nevertheless, I have measured some of the protuberances on the pathological nerve-fibres, and where the nerve itself was only 0.004 *mm.* thick, these swellings amounted to 0.0123, or more than three times the size of the nerve-fibre. They occurred frequently in all the eyes examined, and in such as were undergoing panophthalmitis, where there has been sympathy, they were the general rule. This may, or may not have been a myelitis, but where we find such growths accompanied by interstitial infiltration of the nerve with small round cells, and a complete absence of the nuclei of the interfibrillar connective tissue, or an inordinate increase in their size and number, we are justified in saying that the nerve is undergoing some sort of a pathological disturbance.

It is also true that certain refracting globules may be found within the sheath of a normal nerve, but in most of the specimens I could observe numbers of them crowded together, a condition that could hardly be normal or produced by hardening or *post-mortem* changes, since they do not occur in normal eyes which I have prepared for comparison. Again, in many fibres there is no sign of a medullary substance, but the whole fibre is filled with a continuous train of large globules, giving the appearance of a string of beads. This also does not happen in any one of the normal nerves I have examined, and we are forced to the conclusion that it is pathological (see fig. 2, plate vi *b*).

Then as to the nuclei of the interfibrillar substance, I have found a variety of conditions which are peculiar. Whereas the nuclei of the normal nerve are thin and spindle-shaped, certainly not thicker than the nerve-fibre itself, in some specimens of sympathy they are very large, granular, and round. Sometimes they were not only increased in number, but were also augmented in size, so that in the particular part of the nerve referred to, the whole was made up of $\frac{3}{5}$ nuclei and $\frac{2}{5}$ nerve-fibre. Some of them were perfectly round and puffy, but were connected by strings of connective tissue along the course of the nerve-fibres. This is one condition; further, in some specimens, they

are very long and slender, still spindle-shaped, but not so thick as in the normal nerve. Again they have completely disappeared, and only small strings of connective tissue are seen in the region of the nerve-fibres. Still another condition where not only the nuclei were entirely lost sight of, but also the entire interfibrillar tissue, so that the nerve-fibres ran their course perfectly denuded. This latter condition obtains especially in panophthalmitis, where the individual nerve-fibres show a tendency to break up into small pieces. Since the hardening process or a *post-mortem* change can shrink a tissue or displace it in a variety of ways, but can never do away with it entirely, here we can certainly suppose a pathological condition which was going on during life, and which most certainly could have led to a direct irritation of the nerve.

Case 4 is worthy of notice. It is a panophthalmitis. The iris, ciliary body, and choroid were infiltrated with small round cells, and this eye had caused sympathy which appeared as a plastic irido-cyclitis.

The choroid had accumulations of small round cells, but was also diffusely infiltrated so as to be at least twice or three times the usual thickness. Posteriorly the long ciliary nerve which ran toward the wound was interstitially infiltrated so that small round cells ran in between the outer nerve-fibres, and there was also quite an accumulation of these cells along its course.

A glance at fig 2, plate vi *b* will show the small round-celled infiltration, and also that there are but few of the nuclei to be seen. There is but a small amount of connective tissue, and whole fibres of the nerves are reduced to a string of beads running across the entire field of the microscope, which beads are drops of myeline, probably from the medullary substance. I could trace these fibres up to the ciliary plexus, where some of them entered the ciliary body and ran directly to the wound. Here they unfortunately disappeared, so that I was unable to decide with certainty whether they had been cut or not, but they had nodules on them and had lost the nuclei entirely. The ciliary body was infiltrated and the outer layers were sepa-

rated by the round cells so as to leave large spaces; some small nerves stretched across these spaces, and were evidently under a state of tension. In places the nerve-fibrillæ had their medullary sheaths and axis cylinders, but had nodules on them. They had lost the greater part of the interfibrillar tissue, and the nuclei entirely.

A large bundle made up of 15–20 fibres passed into the sclerotic at about the position of the ciliary plexus, and ran in a canal, probably on the way to the cornea, and this must have been divided and caught in the wound, a part of which had firmly cicatrized. The same condition prevailed in this nerve where no nuclei were to be seen, but some connective tissue running along its course. There were small round cells within the nerve itself, and the nerve-tract was surrounded by them. This must have pressed that nerve in its canal.

The case is interesting from the fact that as an exciting eye, it is in the state of a purulent inflammation and has caused sympathy in the character of a plastic irido-cyclitis. I believe it to be the general rule that such eyes do not produce sympathy, since they destroy the nerves of the exciting eye by the momentum of the inflammation before the second eye has become implicated, but, nevertheless, in this instance it has not been the case.

I have examined other eyes with foreign bodies in them which had passed through the cornea and set up panophthalmitis, but did not bring about sympathy before the exciting eye was enucleated. The comparison between these two conditions shows that while the general state of the iris, ciliary body, and choroid were the same, as far as the small cell infiltration was concerned, there were many differences in the condition of the ciliary nerves (comp. Case 4 and Case 7). They were both infiltrated with small round cells interstitially and along the whole course of the nerve-tract.

In Case 7 the nerve-fibres showed more nodules on them than any eye which I have examined, and the infiltration was much more dense than in Case 4. As already remarked, it is safe to say that every fibre in Case 7 had

these club-shaped swellings, since I could examine a clear place where I could count 40 nerve-fibres, every one of them broken and demonstrating the nodules plainly. The club-shaped swellings measured about 3–4 times the diameter of the nerve-fibres (see fig. 3). The principal point of difference is, that in Case 7 I did not see any of the fibres with their entire medullary substance broken up into isolated globules, which was the condition in Case 4, and also with all the others in a less degree.

Then again in Case 7, or where there was panophthalmitis without sympathy, the infiltration was so great that every nerve-bundle which I examined was completely degenerated and divided somewhere in its course by accumulations of small round cells. In these masses of debris where the nerve had been destroyed, we noticed small glistening drops, probably formed by myeline. In this way all chance of transmission must have been cut off, whereas in eye No. 4 I could not detect a single place, where the continuity of the nerve had been entirely destroyed. There was no marked neuro-retinitis in either one of these eyes.

In Mauthner's lectures on ophthalmology, page 78, we find the following: "In 1877 Goldzieher thought he had discovered the way in which sympathy is transmitted when he published his case in which he found well-marked changes in the ciliary nerves of the enucleated eye. In all the layers of the choroid there were fresh inflammatory swellings and cellular infiltration. The sheaths of the ciliary nerves were densely infiltrated with round cells, and the nuclei of the interfibrillar tissue increased in number; at several points there were accumulations of inflammatory elements which pressed upon the nerve-fibres." After saying that he was not thoroughly convinced that his was a pure case of sympathy, Mauthner further remarks that, were the conditions described by Goldzieher generally found in eyes which have produced sympathy, we would at least have some anatomical proof of the intra-ocular communication through the ciliary nerve, as we have in the case of the optic nerve. His case is, however, a rarity, and it cannot

be doubted that, as a rule, the ciliary nerves of inducing eyes are found to be in a normal condition.

I would like to add the evidence of these eight cases to the one of Goldzieher, as it can hardly be doubted that there was a certain pathological process going on in these ciliary nerves, and also the diagnosis is probably correct in each and every one of them. Of course, in being pathological they do not prove that sympathy is transmitted to the other eye through the ciliary nerves, nor that it does not go through the optic nerve; but they certainly indicate that in some of the eyes at least, which bring about sympathy, there is an accompanying pathological condition in the ciliary nerves in the primarily inflamed eye.

I have used carmine, hæmatoxyline, and picro-carmine, chloride of gold, and chloride of palladium as coloring rea gents. The last answers beautifully in eyes which have already been hardened. A tolerably good gold staining can be obtained by using gold, and then reducing it with chloride of tin.

In vol. viii, part 1, of these ARCHIVES there is a brief notation of a discussion between Dr. Alt, of St. Louis, and Dr. W. Goldzieher as to the condition of the ciliary nerves in eyes which have undergone panophthalmitis, inducing sympathy, and the question seems to be as to whether the parts examined were the large or small ciliary nerves.

By looking back at our Case 4 it will be seen that it is analogous to that of Alt, and this particular eye has furnished, both in its largest and smallest branches, precisely the same conditions. As to stripping the ciliary nerves of their suprachoroidal tissue, of course this seems necessary, and I may add that if we go still further and isolate the individual nerve-fibres it would not be bad, if we wish to say definitely whether there is any pathological change or not. I have pulled the nerves to pieces so that I could see isolated fibres, but in my case this was not necessary, since in the main nerve-trunk, as well as in each and every one of the smaller branches which I have been able to fish out of the eye, there were the changes which I have already described, for the general condition of which, consult figs. 2

and 3. These particular drawings were from parts of large nerve-trunks which ran directly to the cut (they come from eyes in which there were wounds in the ciliary region).

In conclusion, there seems to be at least two ways by which sympathy can be transmitted, or at least two ways in which it may demonstrate itself: one as optic neuritis, the other as cyclitis; or they may exist simultaneously. In some of the eyes which I have examined the retina was detached, and completely degenerated to a string of connective tissue running from the papilla to the posterior capsule of the lens, and there does not seem to have been any sympathy, until a time at which such a retina and optic nerve had certainly become inert as far as any property of active nervous transmission is concerned. In these particular eyes I could see changes in the ciliary nerves which were striking. Chloride of palladium seems to me to be necessary in the examination of eyes which have been hardened, as the gold staining does not work satisfactorily in them, a fact long known to histologists.

These nerves were pathological, and I think that the question is certainly one which would warrant the further attention of the most experienced pathologists.

Those eyes which transmit sympathy within the first 15–20 days may cause it to make its appearance first in the papilla of the sympathetic eye, whereas the others, which cause sympathy through the ciliary nerves, may produce it later.

A fine illustration of this came into Dr. Knapp's clinic some few months ago, representing as typical a sympathy as one could possibly desire, and by his kind permission I add it below. I quote from the books of the clinic:

John Dieffenbach, age 7, admitted Dec. 12, 1880, with a clean cut wound in the lower corneal margin of his right eye—prolapsus iridis. Abscised by Dr. Knapp. The angles of the coloboma fell back so as to allow the sphincter to regain its normal position. Dec. 13th, no reaction. Atropine in eye. Dec. 14th, eye less red, and his whole condition satisfactory. Dec. 18th, left the clinic with his eye white and in a good condition; S = $\frac{20}{20}$. Sphincter in proper place.

It was bitter cold weather during the latter part of December in New York, and the parents were specially cautioned to keep the boy at home and not to expose him to the light. We heard no more of him until Jan. 1, 1881, when he came to the clinic, and Dr K. immediately diagnosticated sympathy. His further record reads: *Re-admitted Jan. 1, 1881, just eighteen days after the injury.* S = $\frac{15}{200}$ in each eye. A delicate synechia in left was noticed, but was broken by atropine. Diffuse opacities in vitreous. Marked neuro-retinitis in right eye. Veins tortuous and dilated. Exposed on Christmas-day to very cold weather, in that he went to see his parents who lived out of the city. Jan. 4, 1881, marked neuro-retinitis in left eye. Jan. 5th, papilla can hardly be seen in the right, while the left is getting clearer. Left iris perfectly dilated. Jan. 6th, sees much better. Eye clearer, etc. Jan. 12th, eye hard; gave fluid ext. jaborandi 30 grs. and eserine. Iris much swollen, with severe pain during the night. Vitreous cloudy, so that the fundus could not be seen. Ordered leeches and eserine. Jan. 13th, his eyes much improved in every way. Jan. 14th, a relapse; the wounded eye has a membrane forming in its pupil, and the right, one behind the lens. Patient sees alternately better and worse, but each attack leaves him with worse sight than before. Feb. 1st, there is a dense membrane forming behind the lens in the sympathetic eye, easily seen by oblique illumination. He can count fingers only with difficulty at one foot. Pericorneal injection moderate. The fundus can no longer be seen, so that it is impossible to say to what extent he has neuro-retinitis. Discharged Feb. 10, 1881. Feb. 20th, R = $\frac{8}{200}$, L = $\frac{4}{200}$. March 10th, R = $\frac{1}{200}$, L = $\frac{20}{40}$; the membrane in this eye being much less dense than before.

An analysis of this case will show that *only eighteen days elapsed between the time at which the boy was injured and that at which he was readmitted under the diagnosis of sympathetic inflammation*, but how much earlier it commenced is impossible to say, certainly at a date prior to Jan. 1, 1881. When seen at this time he was immediately admitted, and the gravest consequences expected. His parents were advised to have his wounded eye removed, but absolutely refused, saying they had rather see him dead than minus an eye. This went on for a week, when they consented, and the boy was prepared for operation, but on examination it was found

that he saw better with his wounded than with his sympathetic eye, and the operation was refused by Dr. Knapp.

The sympathy first made its appearance as *marked neuro-retinitis*, with but a very slight iritis and a single delicate adhesion, which at once gave way under the use of atropia. It was not until the tenth or twelfth day after this that a membrane was seen forming behind the lens in the second eye. It is therefore probable that the first contamination was as neuro-retinitis at an early date, and the irido-cyclitis was marked at the end of one month or later, as is usually the case in sympathetic ophthalmia.

Since writing the above, I have observed that Prof. Moos, of Heidelberg, has published extensive examinations of pathological processes in the nerves of the cochlea, and many of them show changes which are identical with some of those which I have found in the ciliary nerves of eyes which have caused sympathy.

REPORT OF A SEVENTH HUNDRED OF CATARACT-EXTRACTIONS. WITH HISTORICAL AND CRITICAL REMARKS, PARTICULARLY ON THE PERIPHERAL OPENING OF THE CAPSULE.

By H. KNAPP.

THE present, a continuation of my former reports, comprises all the cataracts, complicated as well as uncomplicated, which I have removed by extraction from March 28, 1879, until May 17, 1881. The method of operating was, with a few exceptions (which will be mentioned further on), the combined linear section with peripheric division of the capsule. This modification, described in detail in my previous report, has been subjected to a more extensive trial in the present series of cases, so that its advantages and disadvantages may be more fully demonstrated. As in the former reports, I shall discuss, on the basis of statistical data, the different factors which had a direct or indirect influence on the final object of all operations for cataract—the restoration of sight.

The VISUAL RESULTS, noted when the patients were seen for the last time, were, in the present series, as follows:

S $\frac{20}{20}$ in 8 cases.
" $\frac{20}{30}$ " 16 "
" $\frac{20}{40}$ " 14 "
" $\frac{20}{50}$ " 13 "
" $\frac{20}{70}$ " 20 "
" $\frac{20}{100}$ " 12 "
" $\frac{20}{200}$ " 5 "

S $\frac{20}{200}$ – $\frac{20}{20}$ in 88 cases.

S $\frac{15}{200}$ in 2 cases.
" $\frac{10}{200}$ " 1 case.
" $\frac{8}{200}$ " 1 "
" $\frac{4}{200}$ " 2 cases.
" $\frac{3}{200}$ " 1 case.

S $\frac{3}{200}$ – $\frac{15}{200}$ in 7 cases.
S $\frac{1}{\infty}$ in 3 cases.
S o in 2 cases.

S o or $\frac{1}{8}$ in 5 cases.

If, as before, and as is done by the majority of authors, we call the visual results attained in the first portion—88 cases—good, that of the second portion—7 cases—moderate, and the last portion—5 cases—failures, we have obtained a general survey from which we may enter into the discussion of the details.

The *nationality* and *sex* of the patients have been disregarded in this report, having shown no marked influence on the result of the operations.

I.—AGE.

The influence of the age of the patients will be seen in the following table:

Age in years.	Number of operat's.	Results.*		
		Good.	Moderate.	Failures.
30–39	2	2=100 per cent.		
40–49	9	8=88.89 per cent.	1=11.11 per cent.	
50–59	33	29=87.88 per cent.	3= 9.09 per cent.	1=3.03 per cent.
60–69	42	36=85.72 per cent.	2= 4.76 per cent.	4=9.52 per cent.
70–79	15	14=93.44 per cent.	1= 6.66 per cent.	
80–89	1	1=100 per cent.		

* Good results: $S=\frac{20}{200}-\frac{40}{20}$.
Moderate results: $S=\frac{1}{200}-\frac{19}{200}$
Failure: $S<\frac{1}{200}$.

A decided influence of the age of the patient as to the success of cataract-extraction, cannot be demonstrated by a tabular statement of so small a number of operations as 100. The table may, however, be of value when its figures are added to others, obtained in the same way. The youngest patient of this series on whom I operated by extraction, was a man of 36 years of age, whose two cataracts (which were white and disciform) I removed at the same sitting. I take this occasion to mention that for years I have cultivated, with particular care, the method of solution, by which I have operated patients up to 37 years. The

method which I practise is without iridectomy; it is slow, but the results have been far better than those of any method of extraction. In the year 1880, for instance, among 89 eyes operated on for primary cataract at the New York Ophthalmic and Aural Institute, 41 were operated by discision; not one was a failure.

II.—THE GENERAL HEALTH

of the patient showed no particular influence in this series. A lady of 63 had had *diabetes* for many years, the quantities of sugar in the urine varying greatly. She was in good condition when she was operated on. The operation and recovery were without any disturbance, and her sight, without an after-operation, was $\frac{20}{30}$ two months after the operation, and when she was last seen, four months later, it had not diminished.

Many of the patients were old and feeble, but they made as good recoveries as the others.

III.—THE CONDITION OF THE EYE

had a disastrous effect in one case, in which a chronic *dacryo-cystitis* was followed, after exposure during a winter journey two days before the operation, by an acute exacerbation with purulent discharge from the canaliculi and suppuration of the corneal wound. Chronic dacryo-cystitis in another case did not disturb the recovery in any way. Morbid conditions of the eyeball itself will be spoken of under the head of complicated cataracts.

IV.—THE CHARACTER OF THE CATARACT

has a very great influence on the performance of the operation, the recovery, and the visual result, as the subjoined table will show. I retain the general subdivision of the different kinds of cataract which I have followed in my former reports.[1]

[1] I would refer the reader principally to the report of the fourth and fifth hundreds, these ARCHIVES, vol. vi, Nos. 1 and 2, which contains a synopsis of every

Character of cataract	Number	OPERATION:		RECOVERY:		RESULTS:		
		Smooth	With accidents	Kind	Disturbed	Good	Moderate	Failure
Mature .	62	60 96.8 per ct.	2 3.2 per ct.	53 85.5 per ct.	9 14.5 per ct.	55 88.7 per ct.	3 4.8 per ct.	4 6.5 per ct.
Immature	1	1		1		1		
Hypermature	18	18 100 per ct.	0	16 88.9 per ct.	2 11.1 per ct.	17 94.5 per ct.	1 5.5 per ct.	0
Complicated .	19	10 52.6 per ct.	9 47.9 per ct.	11 57.9 per ct.	8 42.1 per ct.	14 73.6 per ct.	4 2.11 per ct.	1 5.3 per ct.

a.—Mature uncomplicated cataracts.

The *accidents* which occurred in two of the sixty-two operations for mature uncomplicated cataracts, were:

1. *Prolapse of vitreous* in a case in which the cystotome failed to open the capsule. The lens came out together with the capsule, followed by some vitreous. The recovery was slow, on account of diffuse cyclitis and hyalitis. The patient was discharged on the twenty-ninth day with S $\frac{12}{200}$, but three months later, when the irritation had disappeared and the vitreous cleared up, he had S $\frac{20}{40}$.

2. *Escape of vitreous* in a stupid, uncontrollable person of 76 years of age. By pressing with the lids, vitreous escaped after the iridectomy. Capsulotomy and expulsion of lens with no further loss of vitreous. Recovery good, but only the upper part of the pupil free from remnants of cortex. The patient, discharged with S $\frac{8}{200}$, did not return.

In 9 of the 62 cases, *i. e.*, 14.5 per cent., of ripe uncomplicated cataract, the recovery from the operation was disturbed by more or less serious *reactive processes*. Only in the two cases just mentioned they followed upon abnormal operations. The reactive processes were:

1. *Spongy exudation* in 2 cases; results good.
2. *Iritis* in 1 case, from exposure; result moderate.

case; furthermore, tables and a full description of all the details that come into consideration in the general problem. The present and all my other reports were made according to the same plan, but only the results and conclusions from the statistics were published, as a synopsis of the particular cases would have required too much space, and its repetition might have been tiresome.

3. *Diffuse* and *plastic hyalitis* in 1 case; result good.

4. *Irido-capsulitis* in 1 case; result moderate. Remnants of cortex had been left, and the opening in the capsule did not close, but remained gaping.

5. *Irido-cyclitis* in 1 case; eye lost.

6. *Cyclo-capsulitis* in 1 case; a failure. A correct operation was followed by unusual circumcorneal injection and gradual fibrous thickening of the capsule. Patient was discharged with S $\frac{20}{100}$; returned three months later with dense opacities in the pupil, and some adhesions. S $\frac{1}{300}$. A discision gave S $\frac{5}{300}$ at the beginning, but was followed by slow irido-cyclitis, which gradually led to — T_1 and S $\frac{1}{\infty}$.

7. *Suppuration of the cornea* in 2 cases; both failures.

The *visual results* of the 62 cases of uncomplicated hard cataract were good in 55, moderate in 3, nothing in 4 cases.

b.—Immature cataracts.

I have refused to operate on persons with immature cataract, how great soever the disappointment may have been when they were told to wait. In the present series only one eye was operated on in which the cortical substance was not fully opaque. The removal of the cortex was laborious and incomplete. S, at the time of discharge, the nineteenth day, $\frac{20}{300}$, was, by a discision, eleven days later, raised to $\frac{20}{50}$.

c.—Hypermature cataracts.

In the present series, this class gave unusually favorable results. In none of the eighteen operations was there an accident witnessed. The corneal section, the excision of the iris, and the division of the anterior capsule at the periphery along the superior margin of the lens, were large and thorough in each case. The exit of the cataract, in all cases, was easy and complete. Only two cases were followed by mild reaction.

1. The one by a *superficial corneal* ulcer near one corner of the section, disturbing the healing of the wound in no way. It was probably incidental.

2. The other by *plastic capsulitis*.

The visual results obtained were good in all the cases; even the primary acuteness of vision was in no case below $\frac{20}{200}$. In twelve of the eighteen cases an after-operation was made, and by it the vision improved, except in one, where it remained the same. The after-operation was division of the capsule, mostly combined with displacement of the thickened portion.

d.—Complicated cataracts.

The table shows that 9 of the 19 cases of this class, *i. e.*, 47 per cent., were followed by *accidents* during the operation. These accidents were:

1. *Prolapse of vitreous* in 7 cases.
2. *Incomplete removal* in 1 case.
3. *Wounding of the iris* with the cystotome in 1 case.

In eight cases, *i. e.*, 42 per cent., the *healing process was disturbed*, namely by:

1. *Slow closure of the wound* in 2 cases, resulting in good sight.
2. *Reopening of the wound* and *diffuse hyalitis* in 1 case; result good.
3. *Irido-cyclitic processes* in 5 cases, with recovery of good vision in 1, moderate vision in 3, and loss of vision in 1 case.

The *nature of the complications* was:

1. *Adherent leucoma* in 1 case, no accident, no reaction. S good.
2. *Coloboma iridis congenitum* with atrophic condition of iris (other eye the same, small and soft) in 1 case. Prolapse of vitreous. S good.
3. *Choroiditis disseminata*. No accident. No reaction. S good.
4. *Morgagnian cataract with opacities of vitreous* in 1 case. Iritis; closure of pupil. Iridectomy. S moderate.
5. *Opacities of vitreous* with myopia, rarefaction and atrophy of choroid in 9 cases, with S good in 7, moderate in 2.

6. *Subluxation of lens* in 3 cases. S good in all.

7. *Cataracta accreta* in 2 cases. S good in one, 0 in the other.

V.—DETAILS OF THE OPERATIVE PROCEDURE.

The *corneal section* was, in the majority of cases, linear with slight elevation, its ends being situated from one to two millimetres in the limbus conjunctivæ, its apex in, or, frequently, one or two millimetres below, the upper edge of the cornea. Puncture and counterpuncture were at the level of the junction of the upper and middle thirds of the cornea, that is, two millimetres above the horizontal meridian. The length of the section had, as a rule, its maximum extent, and was only to a certain degree adapted to the proportions of the cataract. Several times I made a regular flap section, detaching, according to Wecker, only the upper third of the cornea, or, in large cataracts, a little more than a third, strictly in the transparent corneal margin. These sections, whatever may be said in their favor, readily gape at every pressure upon the eye, the flap tends to tilt, requiring greater caution and delicacy in the subsequent steps of the operation, and, therefore, involving greater danger. The coaptation is less exact and less tight, and a reopening of the wound one or several days after the operation more frequent than in the linear section. All these circumstances render the primary union of the flap less secure.

The linear section, on the other hand, has the great disadvantage of approaching too much to the insertion of the iris and the ciliary body. Even if its centre be sufficiently removed from these parts, its ends have to be near them. The reactive processes were noticed to originate almost invariably in the corners of the wound. Their causes are, in the first place, the bruising which these parts of the wound, more than the others, have to suffer, and, in the second place and chiefly, the intrusion of foreign substances, iris, lens, and capsule, into these corners. I have never disregarded these well-known conditions; on the contrary, I have always dwelt on their importance with particular emphasis, not neglecting to point out by word and pen, and

employ in practice, the means of obviating both the bruising and the various contaminations of the corners of the wound. The impossibility always to satisfy the requirements in this respect lies in the character of the wound, and keeps alive the rivalry of the flap with the linear section. If it were possible to make a sufficiently large linear wound without encroaching upon the limbus conjunctivæ, the flap section would have no right of existence.

The *iridectomy* was, as a rule, made extensive and in three strokes with a pair of curved scissors, several times also with one stroke. The latter does not always give a coloboma large enough to admit of a sufficient peripheric division of the capsule and of an exit of a hard cataract without bruising the iris; in the former case the iris is drawn tight into the corners of the wound, pinched and held there, requiring a subsequent taking up of the incarcerated portions with the forceps, drawing it out and cutting it off. The iridectomy must not be considered as finished before the corners of the wound are quite free, and the edges of the coloboma in their natural position in the anterior chamber. Pressure with a blunt spatula on the adjacent corner, or, if necessary, the reduction and expansion of the puckered iris with a fine probe or spatula, will free the corner of the wound, and clear the way for the capsulotomy. Formerly I disregarded these precautions, taking care to cleanse the whole track of the wound only when the cataract was expelled, but it is better to clear the passage before the cataract goes through it. If this is neglected, the passing lens will press the iris tighter into the corners of the wound, and by bruising prevent its retraction.

The *capsule was opened by a peripheric incision* with a delicate, very sharp "needle cystotome," the cutting edge of which forms with the stem an angle of about 145°. It is passed through the periphery of the anterior capsule along the upper margin of the lens, but not strictly at the equator, in order to avoid eventual opening of the vitreous chamber by rupture of the zonula along the canal of Petit. The particulars of this mode of dividing the capsule are fully described in my previous report. I will here only add

my further experience with it. It has been objected (De Wecker) that the peripheric opening of the capsule, in the majority of cases, does not result in a linear incision, but, like the central division, in an angular rupture. This is surely the case when an ordinary cystotome or a hook is used, but not when we employ a sharp curved needle or a delicate knife. In the great majority of the cases of the present series the linear incision could be demonstrated by the subsequent scar in the capsule, which represented a sharp grayish-white line exactly in the place where the needle-cystotome had passed. In some cases one or both ends of the horizontal linear scar showed an angular extension in the upper part of the anterior capsule, but I consider this as the dilatation of the horizontal opening produced by the cataract during its exit, not as the work of the instrument. Only in exceptional cases have I noticed an irregular opening in the upper part of the capsule, and this may indeed be referred to the action of the cystotome.

For the success of the method, it is essential that a clean incision of the capsule be effected, and that it be sufficiently long for a full-sized cataract to escape without the necessity of enlarging it during its exit. This is only obtained when the iridectomy is large and the corners of the corneal wound are completely freed from the iris. The needle-cystotome may then be passed through the whole length of the corneal section, which is kept slightly patent by gentle pressure upon the globe with the fixing forceps.

Another mode of securing a full-length linear incision of the capsule consists in slitting the capsule open with a fine, long, straight or slightly concave knife-needle, the point of which is inserted into the capsule at the centre of the corneal section, and advanced toward one of its corners, while the cutting edge on its way, by slight raising of the handle of the instrument, rips the corresponding part of the capsule open; then the knife-needle is thrust into the capsule again at the same place as before, and by advancing it as far as the other end of the wound, the other part of the capsule is divided. In this way a very thorough slitting of the capsule may be effected. If several methods are equally safe

and efficient, each operator will choose the one that is easiest to his hands. A thorough study of the methods of opening the capsule will be considered superfluous or pedantic by no one who shares with me the conviction that a kind healing of the capsular wound is as important as a kind healing of the wounds of the cornea and iris.

The primary union of the capsule could be demonstrated in the majority of cases; in many, however, it was evident that the capsular wound did not unite, but remained open, either in the shape of an elliptical slit, or an angular aperture. Such a condition may account in a simple way for the gradual absorption of remnants of lens left in the capsular bag, though the possibility of absorption through a perfectly closed capsule can also be assumed, because a partial absorption of lens-substance without any operation is observed in cases termed atrophic cataract.

Adhesions of portions of the capsule to the corneal scar, especially at its corners, were not infrequently noticed, and exceptionally the capsule adhered to the corneal scar even in its whole length, as has already been mentioned in my previous report.

In a certain number of cases I added, also in this series, a vertical incision to the horizontal, and thus obtained not only an easy exit of the lens, but also a kind healing and excellent visual results. In other cases, operated on in the same way, the vision was troubled by a puckering of the capsule, making a subsequent division necessary.

The mode of healing, in this series, was likewise distinguished by a remarkable absence of irritative processes on the part of the capsule and iris. In the great majority of cases the pupil was fully dilated by one instillation of atropine, there were no synechiæ, the anterior chamber was clear and the iris bright. In some cases, a filiform adhesion connected the iris with the capsular scar. In one case, where there were remnants left and prolapse of vitreous had occurred, a filiform adhesion had formed at the lower part of the iris, with the capsule uninjured at this place. It subsequently tore.

In two cases a true *plastic capsulitis* was observed. At

the linear scar in the capsule, I noticed a gradual thickening which, in the shape of fibres, extended along the columns of the coloboma, producing adhesions of the iris to the capsular scar, but leaving the centre of the capsule free. In one case, this fibrous thickening continued also after the discision of the centre of the capsule, which was done five weeks after the extraction of a hypermature cataract. In eight days the slight irritative symptoms had subsided and the patient was discharged with good vision.

The *expulsion of the lens* was generally effected by pressure with a hard-rubber spoon upon the lower end of the cornea, directed straight toward the centre of the globe. In some cases where escape of vitreous was dreaded, the speculum was removed and the pressure exerted with the finger through the edge of the lower lid.

I have nothing new to say about the removal of remnants.

The dressing consisted in the ordinary charpie-flannel bandage. The flannel, in summer, was replaced by gauze, and when the wound was firmly united, left off altogether. The eye was covered with a small pad of absorbent cotton kept in position by a strip or two of court plaster.

I will not omit to mention that neither spray nor antiseptic dressings, nor disinfection of the instruments and the eye and its surroundings, have been resorted to. All that was done preparatory to the operation was careful washing of the instruments, the hands of the operator, and the eyes of the patients, with ordinary water. I freely confess that the advocates of antisepsis in eye surgery have thus far failed to convince me of the utility of their varied procedures, and I do not think it incumbent upon me to waste time by what I consider to be superfluous complications of treatment. For two years and a half have I had no case of suppuration after any operation on the eyeball, but three occurred lately. I think the statistics of those who use antiseptic means are no better.

VI.—INCIDENTS DURING THE OPERATION.

There were only 11 cases in which accidents of any account occurred.

In one, where I allowed myself to be tempted to perform the extraction without iridectomy, a horizontal division of the capsule was made by passing the needle-cystotome through the pupil under the upper part of the iris. When the lens was removed, the pupil showed a small notch, which seemed to have been caused by *wounding the iris* with the needle. Iritis with dense opacities in the pupil followed. S $\frac{1}{200}$ was raised by iridectomy to $\frac{10}{200}$. The other eye, previously operated on, had a good result.

In another case the *removal* of the cataract was *incomplete*. The cataract, however, was complicated and degenerated. It was irregularly white and gray, as if consisting of different dissimilar portions. The operation proved this to be the case. Several dense portions came out as separate little lumps, together with some soft viscid substance; but at one side a dense white round portion resisted all attempts at removal. It was compressible, and was united to the posterior surface of the iris, probably the ciliary processes; its free part occupied half the pupil. This was evidently one of those cases which earlier authors have described under the name "cataracta cum bursa ichorem continente." I have seen several specimens of this variety of degenerated cataract, and could verify the diagnosis either by removing or rupturing the bag with a spoon. As in the case under consideration, half of the pupil was free, I left the "bursa" in the eye. Irido-cyclitis followed, a subsequent iridectomy gave S $\frac{8}{200}$. The patient has not been seen since. His other eye was blind from a traumatic cataract which had been operated on by the needle (couched probably) thirty years previously. The cataract in the eye upon which I had operated was probably the result of previous sympathetic ophthalmia. The perception of light being tolerably good, I thought an operation, his only chance, should not be withheld from the patient.

Prolapse of vitreous occurred, as mentioned before, in nine cases, seven of which being complicated cataracts. In ordinary cases, when the corneal section is not too peripheric, and the peripheric division of the capsule is executed as described above, prolapse of vitreous is of the rarest occurrence.

Incidents of minor importance were noted, but do not seem to be sufficiently significant to be recorded in detail. I will, however, mention the following as giving occasion to some practical remarks.

Small portions of cortex were left behind in six cases. They were shut up in the closed capsule, and did not produce any reaction. If they encroached upon the pupil, a subsequent discision removed their prejudicial influence on the vision.

Hemorrhage from the corneal section, or the iridectomy, was observed several times, but it was easy to remove the blood from the basis of the coloboma by gentle pressure with a soft sponge—which was not carbolized, but only clean—so as in no case to render the division of the capsule and expulsion of the lens uncertain or difficult.

In a number of cases the *coloboma edges of the iris were crowded forward and stretched by the outcoming cataract.* In these cases the implicated portion of the iris was always exsected, and no reaction noticed.

One case showed a peculiarity during the operation which I have never observed before nor afterward, namely, a complete *version of the cataract.*

The cataract was slightly dislocated downward, the patient very nervous. After the capsulotomy vitreous presented, but did not escape. The speculum was removed. The lens, pushed upward with the lower lid, did not present, but moved up behind the scleral lip of the wound. After it was pushed with a spatula into the pupil again, the speculum was re-inserted. While the upper lip of the wound was held back with a broad spoon, and the lower part of the cornea pressed upon with a rubber spoon, the cataract made a turn of 180° on its horizontal axis, its lower margin presented in the wound, and by very gentle pressure the whole lens came out, its posterior face looking forward, with no loss of vitreous. Recovery undisturbed. Patient, a man of 60 years, discharged on the 18th day, with S $\frac{80}{100}$; three months later S was $\frac{8}{10}$.

In none of these one hundred extractions was a traction instrument of any kind used or required.

VII.—REACTIVE PROCESSES,

which more or less disturbed the recovery, occurred in 19 cases. They were spoken of above when the influence of the character of the cataract was discussed. Recapitulating they were:

1. *Slow closure of wound from a bead of vitreous* keeping the lips of the wound apart in 2 cases; result good.
2. *Reopening of wound* and *diffuse hyalitis*, 1 case; result good.
3. *Superficial corneal ulcer*, 1 case; result good.
4. *Spongy exudation*, 2 cases; results good.
5. *Genuine iritis*, from subsequent exposure, 1 case; result good.
6. *Plastic capsulitis*, 2 cases; results good.
7. *Cyclo-capsulitis*, 1 case; failure.
8. *Diffuse* and *plastic hyalitis*, 1 case; result good.
9. *Irido-cyclitis*, 6 cases; results good in 1, moderate in 3, naught in 2.
10. *Suppuration of the cornea*, 2 cases; both failures.

Among the reactive processes of minor importance, which did not materially interfere with the healing process and had no influence on the visual result, I may mention the following:

Slight *incarceration of iris* was observed in several cases. It needed no special treatment, except in 2 cases. In the one, where iris prolapsed with vitreous, the protruding iris was cut off on the 19th day, and in the other, under the same circumstances, on the 7th day. Results good in both.

After-hemorrhage, reopening and tardy closure of the wound were noticed repeatedly, but never were of any consequence. Several times the wound gave way during the first examinations of the eye, usually made on the second or third day. The ordinary iritis being very rare after correct operations with peripheral capsulotomy, the early instillation of a mydriatic, and consequently also the early opening of the eye, have become superfluous and had better be postponed until the third, fourth, or fifth day. Inspection, and, if necessary, cleansing of the lids and changing

the charpie, contribute, however, to the comfort of the patient, and can be done without pressing on the eye. In this respect, the condition of the patient is our best guide. In restless and irritable persons who are apt to press their eyelids together or move the eyes forcibly even when the lids are closed, I have seen a gush of tears run through the palpebral fissure when only the charpie was changed. Evidently a rupture of the wound had occurred. Such observations teach caution in changing the bandage.

VIII.—AFTER-OPERATIONS.

Besides the two cases of abscision of small prolapses of iris, there were forty-three after-operations performed on these one hundred cases of extraction, namely:

1. *Iridectomy* in three cases of closure of the pupil by irido-cyclitis. Results in one, the case of degenerated cataracta cum bursa, moderate; in the other two, S $\frac{1}{\infty}$, *i.e.*, failures.

2. *Iridotomy* in two cases: in the one for closure of pupil after iritis from the operation; S $\frac{1}{200}$ was raised to $\frac{10}{200}$; in the other for old pupillary obstructions after an extraction of a cataracta accreta, which had healed without irritation; S was raised from $\frac{12}{200}$ to $\frac{15}{200}$, only on account of abundant opacities of the vitreous, though the pupil was perfectly clear.

3. *Discision of the capsule* with a scalpel-needle in 38 cases. I had a series of such needles made, the cutting edge varying in length between 2 *mm.* and 6 *mm.*, and use this kind of needle also for discision of primary soft cataract. It is important that the division is not done by tearing, but by real cutting. It *can be accurately performed only under oblique illumination*, which enables the operator to follow the point of the needle, and to watch the resistances in the capsule as well as the extent of the incision. If the stem is not correctly proportioned to the breadth of the needle, so as to prevent the escape of aqueous humor, it will be difficult, and in some cases impossible, to pass the needle in front of that portion of the capsule left undivided by the first incisions. Under these circumstances it

is best to withdraw the needle from the eye and make the second incision later, in case the first produced an insufficient opening. If there be no reaction, the second incision may be done as early as three or four days after the first. The details in the performance of the after-operation are quite important and form an essential part of the whole method, as about 50 per cent. of the patients sooner or later have to undergo it. Having spoken of it at some length in my previous report, I cannot now repeat the description of the technique. When the discision has well succeeded, a triangular or quadrangular opening will be seen in the lower part of a middle-sized pupil, singularly contrasting, by its perfect blackness, with the capsule that encases it as a grayish semi-transparent tissue paper.

The *indications* for the division of the capsule are found by the visual tests and the ophthalmoscope. Whenever S is only $\frac{3}{10}$ or less, and the ophthalmoscope does not reveal opacities of the vitreous or some affection of the fundus to explain the insufficient sharpness of sight, but rather a haziness which, by its design and its immobility in the pupillary area, easily manifests itself, both by focal and transmitted light, as opacity or folding of the capsule, I advise an after-operation. The ophthalmoscope is in this respect an invaluable objective test, for the operator can, from the degree of the dulness in which the fundus appears, estimate the density of the capsular veil hanging before the fundus. When the after-operation has been successfully performed, the fundus is seen through the new aperture so clear and bright as we see it only after extractions of the lens together with the capsule. An eye with S $\frac{3}{8}$ or even $\frac{3}{7}$ is good enough for all ordinary purposes, the patient can even make out fine type, but not with ease and comfort. Reading for him is a labor, whereas with S from $\frac{3}{4}$ to $\frac{3}{2}$ it is a pleasure which he can enjoy without an effort for any length of time. When once the small irritation from the discision has passed away, the vision does not decline any more. Without an after-operation we can never foretell whether the pupil will preserve its clearness, or whether the capsule will interfere with sight by subsequent wrinkling and opacifica-

tion. If S is $\frac{20}{40}$ at the discharge of the patient or six weeks later, I leave it to him whether he wants to obtain greater acuteness of sight or not. I do not operate on patients with S > $\frac{20}{50}$, that is to say, I do not make "preventive discisions," because a discision can be performed at any period after the extraction, and should not be resorted to before the sight has actually become dull. I have seen many patients who were operated on according to this method, preserve good sight ($\frac{20}{40}$ to $\frac{20}{50}$) unchanged from one to three years and a half, that is, so long as I had opportunities to examine them thus far. As it takes commonly from 6 to 12 weeks after the extraction until the patients attain the greatest visual acuteness their eyes are capable of without an after-operation, the discision should not be made before that time, except when opacities or a beginning wrinkling of the capsule indicate that the natural clearing process will not suffice to render their sight sharp enough.

The after-operations were made from two weeks to one year after the extraction. If patients lived at some distance from New York and a discision was indicated, it was generally done in the third or fourth week, but not before the irritative symptoms from the first operation had disappeared. If reactive processes of any account had followed the extraction, an early discision was never made. The discision was followed by considerable reaction only in one case, where chronic cyclo-capsulitis had occurred after the extraction. S, $\frac{20}{200}$ at the time of discharge, had diminished to $\frac{1}{200}$ in three months, was raised by the discision to $\frac{5}{200}$; the irritation lasted three weeks, and one year later S was $\frac{1}{\infty}$. The case is entered among the failures.

The great majority of the patients showed no reaction from the discision, or only slight circumcorneal injection for a day or two. They were discharged mostly on the fifth day. Two who had been discharged free from reaction on the fifth day, exposed themselves at home, and returned a few days later with increased circumcorneal injection, congestion of the iris, and turbidity of the aqueous and vitreous humors. Leeches, atropia, rest, and darkness cured the aggravation in a few days.

In several cases the aperture in the capsule did not become entirely clear, but delicate fibres or membranous opacities, attached to one side of the capsular opening, floated in the vitreous. They dimmed the sight to a certain degree, but never proved otherwise injurious, and commonly diminished in intensity or disappeared. The diffuse opacity of the vitreous, which is frequently present to a certain degree during the first days after the operation, always clears up rapidly and completely.[1]

In all cases except two, where vision remained the same, the acuteness of sight was materially increased by the discision. The table at the beginning of this paper, which shows S as obtained in the hundred cases of this series, gives the results of the last testing, which, when after-operations had been performed, commonly was from 5 to 8 days after the discision. S at that period is usually lower than later, when the vitreous has cleared up and the irregularity of the cornea has disappeared. This applies also to the subjoined table on the results of the discision.

The way in which the vision changes after this operation may be illustrated by one example which is representative of many.

D. C., æt., 55. Cataracta dura matura. Extraction, June 5, 1879. Apex of section two millimetres below upper edge of cornea. No reaction; corneal and capsular wounds found healed on third day. S $\frac{20}{100}$ at discharge, 14 days after the operation; $\frac{20}{40}$ 5 weeks later. One year after the operation S was $\frac{20}{200}$. A sharply defined linear scar ran through the upper part of the capsule, its outer end adhering to the corneal scar. Vertical wrinkles ran from the linear scar not only downward but also upward through the small piece of capsule situated between the scar and the equator. Fundus veiled; ophthalmoscopic metamorphopsia. Discision ⊥-shaped, giving a large central and clear opening. No reaction. Five days later patient discharged with S $\frac{20}{40}$.

[1] I would like, however, to remark that cataract in general seems to me to be complicated with opacities of the vitreous in a much greater percentage of the cases than is mentioned in our statistics. In beginning cataract I find them to a low but distinctly discoverable degree in many cases. When the opacity of the lens is advanced, we cannot diagnosticate them any more, and when we notice them after the operation, we have no means of discriminating whether or not they existed before.

The following table will comprehensively show how long after the extraction the discision was made, and how much the vision was improved by it:

No.	Time of discision after extraction.	S	
		Before discision.	After discision.
1	14 days	$\frac{20}{100}$	$\frac{20}{30}$
2	14 "	$\frac{20}{100}$	$\frac{20}{30}$
3	14 "	$\frac{20}{100}$	$\frac{20}{50}$
4	14 "	$\frac{20}{100}$	$\frac{20}{70}$
5	16 "	$\frac{20}{60}$	$\frac{20}{30}$
6	16 "	$\frac{10}{200}$	$\frac{20}{100}$
7	19 "	$\frac{20}{100}$	$\frac{20}{30}$
8	19 "	$\frac{20}{60}$	$\frac{20}{30}$
9	20 "	$\frac{20}{100}$	$\frac{20}{40}$
10	3 weeks	$\frac{20}{50}$	$\frac{20}{40}$
11	4 "	$\frac{20}{100}$	$\frac{20}{40}$
12	4 "	$\frac{8}{200}$	$\frac{20}{100}$
13	4 "	$\frac{20}{100}$	$\frac{20}{70}$
14	4 "	$\frac{20}{100}$	$\frac{20}{30}$
15	4 "	$\frac{20}{200}$	$\frac{20}{70}$
16	4 "	$\frac{20}{200}$	$\frac{20}{30}$
17	4 "	$\frac{20}{100}$	$\frac{20}{50}$
18	31 days	$\frac{20}{200}$	$\frac{20}{70}$
19	33 "	$\frac{20}{200}$	$\frac{20}{50}$
20	5 weeks	$\frac{20}{70}$	$\frac{20}{30}$
21	5 "	$\frac{20}{70}$	$\frac{20}{30}$
22	5 "	$\frac{20}{100}$	$\frac{20}{40}$
23	5 "	$\frac{20}{100}$	$\frac{20}{30}$
24	5 "	$\frac{20}{100}$	$\frac{20}{30}$
25	5 "	$\frac{20}{100}$	$\frac{20}{100}$
26	6 "	$\frac{20}{60}$	$\frac{20}{30}$
27	6 "	$\frac{20}{40}$	$\frac{20}{40}$
28	6 "	$\frac{20}{200}$	$\frac{20}{50}$
29	2 months	$\frac{20}{200}$	$\frac{20}{50}$
30	2 "	$\frac{20}{100}$	$\frac{20}{70}$
31	2 "	$\frac{20}{200}$	$\frac{20}{40}$
32	2 "	$\frac{20}{100}$	$\frac{20}{30}$
33	3 "	$\frac{1}{200}$	$\frac{15}{200}$
34	3 "	$\frac{20}{50}$	$\frac{20}{30}$
35	3 "	$\frac{1}{200}$	$\frac{15}{200}$
36	5 "	$\frac{20}{100}$	$\frac{20}{200}$
37	5 "	$\frac{20}{200}$	$\frac{20}{50}$
38	1 year	$\frac{20}{200}$	$\frac{20}{40}$

The table gives testimony not only of the innocence of discision performed under these conditions, but also of its efficacy, S being materially improved in almost all cases.

IX.—HISTORICAL AND CRITICAL REMARKS ON THE PERIPHERAL OPENING OF THE CAPSULE.

When I published my first observations concerning the peripheric division of the capsule, I knew very well that this procedure in itself was not new, for I had seen it occasionally in many hospitals, and had resorted to it myself when the attempt to open the capsule in the centre had failed or proved insufficient. This was demonstrated by the presentation of the edge of the crystalline body in a sufficiently large corneal wound, without making any progress in escaping even if the eyeball was pressed upon. The operators then ripped the periphery of the capsule along the corneal section more or less extensively, whereupon the lens emerged at once and easily. As all kinds of cataract occasionally had been expelled in this way, there was no doubt that this was one of the available modifications of opening the capsule.

In *combination with the central laceration* it was practised by v. GRAEFE and many others. I myself have operated in this way in hundreds of cases of extraction, but gave it up in favor of the removal of a quadrangular piece of the anterior capsule. The combined division of the capsule is mentioned in several text-books; for instance, already in the earlier editions of Soelberg-Wells, further in De Wecker's Traité complet, 2d edition, 1868, and in Arlt's Operationslehre, in Graefe-Saemisch's Cyclopedia.

As a *method for particular kinds* of cataract the peripheric opening of the capsule has been recommended by WECKER for cataracta accreta, and by MARTIN and GRÜNING for cataracta Morgagniana. Wecker says in *Zeh. Klin. Mon.*, 1879, page 400: "In Morgagnian and adherent cataracts, and when the centre of the capsule was thickened, the peripheric opening has, I should think, long been resorted to by all practitioners. It was first accurately communicated by me in 1873, in the description of my method of operating

for adherent cataracts,"[1] In looking up the original I find, concerning the subject under consideration, the following:

"Je pénétre avec le couteau de de Graefe à une distance d' un millimètre du bord supéro-externe de la cornée, et j' enfonce l' instrument à la fois dans la cornée et au-dessous de l' iris. Le couteau glisse alors parallèlement à la surface postérieure de l' iris. * * * Généralement, en pratiquant cette section avec précision, on n' intéresse pas le cristallin. * * *

"Le deuxième temps de l' opération a pour but l' ouverture de la cristalloïde. Aprés avoir * * *, j' exerce avec une pince à fixation une faible pression sur le globe de l' œil * * *, le bord du cristallin se présente dans la plaie, et il est aisé d' inciser la capsule dans toute l' étendue de la section et près de l' équateur cristallinien.

"Le troisième temps consiste dans la sortie du cristallin, à laquelle on arrive au moyen d' une légère pression. * * *"

Then he removes with his pinces-ciseaux and a forceps the triangular piece of iris and capsule which extends from the corneo-capsular wound to the pupil. This description shows that a cataract can be expelled not only through a corneo-capsular section after excision of the iris, but even when the iris is still in the eye.

At the International Medical Congress held at Geneva in 1877, G. Martin, de Cognac, read a paper on Morgagnian cataract. He recommended to extract this variety by Lebrun's median flap section and a peripheric (horizontal) division of the capsule,[2] and reports one successful case. Dor stated in the discussion that he had operated in the same way for Morgagnian cataract, and so had Dr. Gayet, of Lyons. Grüning described a case of Morgagnian cataract,[3] which he extracted through a peripheral (horizontal) division of the capsule and Graefe's corneal section. He thinks that Lebrun's section does not admit of the peripheric division of the capsule and of the expulsion of the nucleus so easily as Graefe's section does.

[1] Annales d' Oculistique, Tome lxix [not lx as in *Zeh.*], p. 258, May, 1873.
[2] Annales d' Oculistique, 1878, t. 79.
[3] These ARCHIVES, vol. vii, p. 53, etc., 1878.

As a *general method* the "equatorial discision of the capsule" was first tried and described by Dr. GAYET, Professor of Ophthalmology in the medical faculty of Lyons, in 1873,[1] of which fact I was not aware when I made my first communication on this subject in these ARCHIVES (vol. vi) and at the Ophthalmological Congress at Heidelberg in August, 1878. My attention was first drawn to Gayet's procedure by Dor at the Heidelberg Congress in 1878. Gayet and Dor's views and experience on the peripheric division of the capsule are contained in a very elaborate *thèse pour le doctorat en medecine* by Dr. Jules Quioc.[2] Gayet opened the capsule with Graefe's knife, which I also did in my first peripheric capsulotomies, but I have found the above-described cystotome handier to me and equally efficient. His first operation was made May 15, 1873, then followed in the rest of 1873 and during the year 1874 one hundred and fifty-eight operations, in 1875 only one, in 1876 twelve, in 1877 none, in 1878 nine, on the whole, 181. I rely for these and the subsequent statements entirely on the thesis of Dr. Quioc, which was made under the auspices of his teacher, Prof. Gayet, who, aside from his first communication, has published nothing on this subject. Dr. Quioc further says[3] that "Gayet, when he presented his note to the Congress for the Advancement of the Sciences, had not yet any statistics that were sufficiently conclusive. During the next two years he continued in his service at the Hôtel-Dieu to operate according to his method on every kind of cataract concurrently with the other modes of opening the capsule. But seeing that his method, when applied to all varieties, yielded results not very perceptibly (pas très-sensiblement) superior to the others, he resorted to it only seldom, and almost exclusively for soft or half-soft cataracts." The object of Gayet was to "simplify the operation, and by preserving both capsules, make the trau-

[1] Congrès pour l' avancement des sciences, Lyon, 1873. Séance du 22 août, et *Gazette hebdomadaire*, 1873, No 35.

[2] De la Discision Périphérique ou Équatoriale avec Conservation des deux Cristalloïdes dans l' Extraction Linéaire et Périphérique de la Cataracte. Paris, 1879.

[3] *L. c.*, p. 8.

matism as small as possible." He has made no after-operations.

From the beginning, the present writer has found the secondary division of the capsule an essential feature of the whole method. It is its completion in the majority of cases. For the sake of safety, the clearing of the centre of the pupil is postponed to a later period. That in a considerable minority of the cases this after-operation is not required, is so much the more gratifying. If the after-operation could not be performed safely both soon after the primary operation and at any later period, the method could not claim to be of general application. Gayet, also, disregarding the secondary division of the centre of the capsule, found that he had to restrict it to a limited percentage of the cases, namely, to those soft or semi-soft cataracts which had a clear capsule. He excludes, for instance, all hypermature cataracts, and yet the results obtained just in this kind have been most satisfactory. Quioc terminates his very instructive brochure with the following words[1]:

"To sum up: the method is excellent for all cataracts with a soft cortical substance, inferior for hard cataracts."

My previous report of a hundred cases of extraction (the sixth hundred), published in the July number, 1879, of these ARCHIVES, refers to 66 successive cases of extraction with peripheric capsulotomy, and, together with the preliminary communication in vol. vi, and the present paper, contains the substance of my views and experience on this subject.

I have further to state that Dr. Quioc's paper contains, besides Gayet's statistics of 181 cases, the report of 19 cases operated on by Prof. DOR, after his return from the congress at Heidelberg, in Sept., 1878; and lastly, a paper on peripheral division of the capsule of the lens, read before the subsection of ophthalmology, at the annual meeting of the British Medical Association, at Cork, August, 1879,[2] by Dr. C. E. FITZGERALD, of Dublin. Dr. Fitzgerald shares the views of the writer of the present paper whose

[1] Page 61. En résumé, méthode excellente pour toutes les cataractes à couches périphériques molles, inférieure pour les cataractes dures.

[2] *Brit. Med. Jour.*, Nov. 22, 1879, p. 811, etc.

manner of operating and results he had personally witnessed in New York. He recommends the method "according to which he had operated on 27 cases, lost none of them, and the healing in all of them had gone on smoothly."

NEW YORK, *June* 25, 1881.

REPORT OF THE MEETING OF THE AMERICAN OPHTHALMOLOGICAL SOCIETY HELD AT NEWPORT, R. I., JULY 27–28, 1881.

By CHARLES J. KIPP, M.D.

"The report here following is intended to give a picture of this year's work, not authoritatively, to serve as reference, but as news pointing to the variety, abundance, and importance of the material to be contained in the forthcoming 'Transactions.' The reporter knows that with his best intentions he could not help omitting or stating insufficiently, and sometimes perhaps incorrectly, subjects both interesting and instructive."

The meeting was presided over by Dr. H. D. Noyes, of New York, who, together with the other officers, was reëlected.

Dr. Wm. F. Norris, of Philadelphia, read a paper, entitled on the administration of **anæsthetics in Bright's disease** of the kidneys, and on some cases of **sudden death after cataract operations.** Two deaths. In both cases the patients were etherized; both died comatose, and in both careful autopsies revealed no organic lesions except those belonging to Bright's disease. The first patient was a child five months old and in good health, upon whom he operated by discision. The child recovered consciousness, but died soon afterward. Intense congestion of kidneys, cloudy swelling and fatty degeneration of epithelium, most marked in the cortical portion. There was no history of hereditary kidney disease. The second patient was a woman 60 years old, supposed to be in perfect health. Recovery from anæsthesia was prompt. On evening of following day she was somewhat feverish, and the urine diminished in quantity and loaded with urates. From 4th to 9th day she sat up and felt pretty well. After that time unfavorable symptoms manifested themselves. On the 16th day she was delirious. On 17th day urine was found to contain a small quantity of albumen, and hyaline, and fatty and granular casts. Patient died on 18th day after operation. Autopsy showed all organs to be healthy except heart, in which there was moderate enlargement of left ventricle; and the kidneys, which were markedly congested, and showed increase of interstitial tissue, fatty degeneration of epithelium, and cast-material in the uriniferous tubes.

Discussion.—Dr. Mathewson, of Brooklyn, has extracted cataracts, under ether, from patients known to have Bright's disease. All recovered promptly.

Dr. CARMALT, of New Haven, related two cases in which death followed cataract extraction performed without anæsthetics. In one case death took place four hours after operation, and seemed to be due to shock, which might possibly have been avoided by the use of an anæsthetic. No autopsy. In the other case the patient had had diabetes, from which she had apparently recovered. Dr. C. assisted in the operation. There was no attempt at repair. Patient failed rapidly, and died on fourth day. Dr. NORRIS remarked that the action of ether in many cases of fatty heart was beneficial rather than otherwise. He had been told by Dr. Hunter, of Philadelphia, who had given ether in a very large number of cases, that the heart-beat was strengthened by ether. The risk of any surgical operation, however, when the case was complicated by kidney disease, had been regarded as serious. Dr. NOYES, of New York, has used ether and chloroform freely in a large number of cases, but had not had a fatal result in consequence. He has used ether when he knew there was Bright's disease, and also in cardiac complications, and without unfavorable consequences. He regarded Dr. Norris' first case as unique. He is in the habit of giving bromide of potassium, and sometimes hydrate of chloral, before the operation, and thinks that in a certain proportion of cases the occasion for the use of anæsthetics has thereby been considerably diminished. It has been his practice, where anæsthetics are given, to produce simply the primary anæsthesia, make the corneal incision, and then allow the patient to fully recover consciousness, which is utilized in the subsequent steps of the operation.

Dr. HASKET DERBY, of Boston, read a paper on **anæsthesia and non-anæsthesia in the extraction of senile cataract,** with *comparative statistics* of 200 cases. The author avoided anæsthesia as much as possible. A mixture of eserine and vaseline was introduced into the conjunctival sac before the operation, and v. Graefe's operation performed in all cases. The eye was not opened for seven days after extraction, unless untoward symptoms were developed. Of 200 uncomplicated cases of senile cataract one hundred were operated under ether and one hundred without anæsthesia. The average age of the patients operated under ether was 67.7 ; without, 65.8. Loss of vitreous in 14 with ether, and 9 without. The duration of treatment was 18.3 with ether, 16.5 without. Vision, $\frac{1}{10}$ or more, was obtained in 81 with ether, and 89 without, Partial success (vision from $\frac{1}{15}$ to $\frac{1}{60}$) in 8 cases with ether, and 9 without. There was reasonable prospect of success from a secondary operation in 2 of the last-named, operated under ether, and 1 without. The total failures were 9 with ether, and 1 without.

Discussion.—Dr. D. B. ST JOHN ROOSA, of New York, and Dr. H. W. WILLIAMS, of Boston, thought that the advantages obtained by the use of ether were considerable. The resistance offered to the fixation forceps by an eyeball not rendered insensible by anæsthesia, it is believed, increases the danger of expulsion of vitreous, and was more to be feared than the possible danger of prolapse of vitreous from vomiting. Both are of the opinion that it is good practice not to open the eye before the seventh day, unless symptoms of inflammation appear. Dr. KIPP, of Newark, thinks that the danger of escape of vitreous is much greater without than with anæsthesia. Dr. B. JOY JEFFRIES, of Boston, can see no objection to the use of ether, but does not hesitate to operate without it. Dr. STRAWBRIDGE, of Philadelphia, rarely employs anæsthetics for cataract extraction.

Dr. B. JOY JEFFRIES spoke of the **peculiar look of the color-blind,** first noticed by Prof. Wilson, of Edinburgh, and described by him as "an absent, anxious glance," as "a startled, restless look," and as "an eager, prying, aimless air." D. J. has observed this peculiar look in a number of color-blind. It belongs to them alone, and is not due to any ametropic condition, occurring as it does in the emmetropic. He describes it as a certain liquid look, as if the eyes were slightly suffused. He has now and then detected a color-blind person by this look. No attempt was made to explain this peculiar expression.

Dr. W. S. LITTLE, of Philadelphia, described a case of **persistent hyaloid artery** in a boy 5 years old. S $\frac{20}{xx}$.

Dr. LITTLE read also a paper entitled a contribution to the study of **glaucoma,** in which he gave the details of four cases, all bilateral. The patients were all under 20 years of age. Three of the cases occurred in one family. In all cases the eyes were hypermetropic, and in three of the cases the patients suffered also from hemorrhoids. In one of the cases acute fulminating glaucoma was developed 12 hours after the instillation of atropia, and some days later the fellow-eye became glaucomatous. The author thinks the fact that 3 of his cases occurred in one family is especially instructive as showing a tendency to heredity, and he infers, from the coëxistence of hemorrhoids in 3 of these cases, and in some others observed by him, that, since in both diseases textures supplied with a sphincter muscle are involved, a somewhat similar morbid action may take place in both.

Discussion.—Dr. NOYES referred to two cases which illustrated Priestly Smith's theory that the essential pathology of glaucoma was an exceedingly narrow circumlental space. He resorted to total removal of the iris in both cases, and was able to demonstrate beyond question that the lens was excessively large.

Dr. JOHN GREEN, of St. Louis, spoke of **iridotomy with division of an anterior synechia** by the use of Wecker's pince-ciseaux. He had used this instrument frequently, and had been led to attach great value to it. The patient operated on was a child whose eye had been cut by a penknife, the wound involving the cornea, the iris, and the lens. An anterior synechia was one of the results. After all the irritation had subsided he performed an operation, which consisted in opening the cornea with a Graefe's knife, introducing the scissors, and snipping off the attachment close to Descemet's membrane. But little irritation followed the operation. Vision, which had been practically nothing, was raised to $\frac{1}{30}$ with $+\frac{1}{8}$ glass. A membrane which remains behind pupil he proposes to divide with a needle. The deformity has been entirely removed.

Dr. GEO. C. HARLAN, of Philadelphia, related a case of **congenital paralysis of the sixth and seventh nerves of both sides.** The patient, 18 years of age, had been able, with some difficulty, to get a common-school education and to learn his trade. All the other orbital muscles are normal. The orbicularis is entirely powerless. There is marked epiphora and slight haziness of cornea. O. D. S $\frac{20}{180}$; O. S. S $\frac{20}{100}$. Not improved by glasses. Fundus seemed normal. Has never had diplopia. The author thinks that the complete congenital paralysis of the two abducens, which are so widely separated in their course after they leave the brain, points to a central cause, and supports the view that they arise from the same nucleus.

Dr. FRANCIS B. LORING, of Washington, read a paper on a source of **danger in the eye-glass frame** as commonly manufactured, in which he called attention to the fact that the small acorn-pointed spike that is always put on the *inner* side of the frame, in order to keep them together when closed, is a source of danger to the eye. Two cases were presented, in which the conjunctival and subconjunctival tissue had been lacerated, and in the other the globe perforated, with subsequent phthisis bulbi and loss of sight. He recommends that in all those cases in which the same glasses are habitually worn the spike shall be entirely removed, and that in all others it shall be placed on the *outer* side of the frame, a corresponding twist, if necessary, being given to the spring.

Dr. SAMUEL THEOBALD, of Baltimore, read a report of a case in which **useful vision** was maintained through a number of years **by the aid of a totally dislocated lens.** The dislocation of the lens was supposed to be congenital. Corectopia was present in one of the eyes. Standing erect his vision with $+\frac{1}{24}$ was S $\frac{18}{10}$ in right eye; by bending his head well forward he was able to read Jaeger, No. 1, at $1\frac{1}{2}$ inches, without any glass; while in this position he could also read same type with a $-\frac{1}{2}$ glass, with $-\frac{1}{4}$ some words of Jaeger No. 1, at 2 inches, and with a combination of 2 $-\frac{1}{4}$ glasses he could read J. No. 4, at 3 inches. With a combination of two $-\frac{1}{8}$ and a $-\frac{1}{4}$ he could see No. 30 of Snellen's test types, at 4 feet, when placed on floor. The +glass for distant vision showed that the elongation of eye corresponded only to a myopia somewhat less than $\frac{1}{4}$—less than $\frac{1}{8}$ of what, with lens in position, was manifest. This examination showed that the focal length of the dislocated lens was not only much less than the unaccommodated lens of the diagrammatic eye, but somewhat less even than that of the accommodated lens. We would scarcely be justified in assuming that the lens in this instance was equivalent to a normal lens just liberated from the restraining influence of its ciliary attachment; nevertheless, the extreme convexity which it exhibited is significant, and seems to afford additional evidence in favor of the now generally accepted theory of accommodation propounded by Helmholtz.

Dr. H. DERBY exhibited an **electro-magnet** for the removal of foreign bodies from the eye, devised by Dr. H. W. Bradford. See these ARCHIVES, this volume, p. 236.

Dr. KIPP stated that he had, with the aid of this magnet, extracted a fragment of iron from the vitreous. The patient, a young man, felt something strike his eye while at work, and soon afterward his sight failed, and the eye became painful. When first seen there was already traumatic cataract, and a yellowish reflex was noticed from upper outer part of vitreous. The foreign body had passed through cornea, iris, and lens. A meridional incision, about 10 *mm.* in length, was made between inferior and external recti, commencing about 8 *mm.* from corneal margin. A bead of clear vitreous protruded. The magnet was introduced through the incision to the extent of about 10 *mm.*, and, after a few moments, withdrawn, without, however, bringing with it the foreign body. It was now again introduced to about the same length, but in somewhat different direction, and immediately afterward a distinct click was felt. On withdrawing the magnet, the piece of iron was found hanging to it. The wound healed without reaction. Some months later the eyeball was found to be slightly smaller than the other, but perception and projection were good. Dr. JEFFRIES referred to cases in which he had successfully removed foreign bodies from the

cornea, by means of the magnet exhibited. It was perhaps worth while to remember that when the tissue had softened a little around it the foreign body might perhaps be readily removed with a magnet. Dr. NOYES remarked that the true test for the magnet was the power it had over small particles of iron, and the distance at which it would act upon them. He referred to a case of foreign body in the iris, in which the permanent magnet devised by Dr. Gruening was used, but no matter how near the extremity of the point of the magnet was brought to it, the foreign body remained *in situ*, and he was obliged to remove it with a surgical instrument. Dr. Gruening, however, had used his instrument successfully in removing foreign bodies from the vitreous, and Dr. Oppenheimer also had used it with satisfactory results. It remained to be seen whether Dr. Bradford's apparatus possessed any special advantages over that offered by Dr. Gruening. Dr. CHARLES S. WILLIAMS, of Boston, mentioned several cases in which he had removed steel chips from the anterior chamber by means of this magnet. In one case a foreign body was seen lying in the iris, but it was doubtful whether it was steel or stone. As soon, however, as the magnet was brought in contact with the cornea, the iris came forward, showing that the particle was metal. An incision was now made in the cornea, and the fragment of steel withdrawn with the magnet. Recovery perfect.

Dr. S. D. RISLEY, of Philadelphia, read a paper on the **comparative value** of the mydriatics, including the **sulphates of atropia, duboisia, and hyoscyamia, and the hydrobromate of homatropia, for the purpose of determining errors of refraction.** A mydriatic, it was contended, should be used not only for the purpose of paralyzing the accommodation, but also to remove the condition of retino-choroidal disturbance, so frequently associated with asthenopia from eye-straining, that it was not possible in many instances to correctly determine the existing error of refraction until the irritable condition of the eye had subsided. Therefore, the time it was found necessary to continue their use, before prescribing the correcting glass, furnished an important indication of the comparative value of the mydriatics employed, since in all cases this was the method insisted upon. An accompanying tabular statement showed that in 50 cases, taken consecutively from the latter cases treated under *atropia*, the average time had been 5½ days. In 81 cases, when *duboisia* had been used, 3¼ days was the average duration of treatment; while in 88 *hyoscyamia* cases something less than 3 days was found sufficient. In 111 *homatropia* cases the average time was only 31 hours. Fifty-eight of the 111 cases, however, had used the drops less than 24 hours, and 28 less than 6 hours; the drops having been used in many of them experimentally, and the results gained after using the homatropine an hour or more compared with the determination after the subsequent prolonged use of atropia or duboisia—generally to be confirmed. The table showed conclusively that in the routine of practice, either of the new mydriatics had secured to the patient a much shorter course of treatment and a great saving of time to the surgeon. These advantages were multiplied by the rapidity with which the influence of the duboisine, hyoscyamine, and especially the homatropine disappeared. While atropine maintained a partial control over the accommodation for from seven to fourteen days or even longer; that after using duboisine or hyoscyamine the patient could read on the third or fourth day, and its influence had quite

disappeared on the fifth day. The showing for homatropine was still more favorable since it relinquished its command in twenty-four hours, the patient often being able to read in from eight to twelve hours. Regarding their relative efficiency, it was found by the study of a series of carefully compiled tables of comparison, that when used, after the methods pointed out in the paper, for the purpose of correcting errors of refraction, the new mydriatics were quite as reliable as atropia, which, because of the long experience had in its use, was taken as the standard of comparison. By these tables it was shown that duboisine was used in comparison with *atropine* in 32 eyes, appearing superior in 7, equal in 12, inferior in 9—two of which were doubtful. Homatropine was compared with the atropine in 70 eyes, appearing superior in 14, equal in 23, inferior in 22, but was immediately followed by the atropine in 38 of the 70 eyes, often after but one or two instillations, the length of time in a number of instances allowed to the homatropine not being greater than an hour or an hour and a half. Hyoscyamine was used in comparison with the atropine in 29 eyes, appearing superior in 4, equal in 13, inferior in 10, having after a few hours' use been immediately followed by the atropine in 17 eyes. Thus, it was shown that, notwithstanding the fact that the atropine was given the advantage of subsequent prolonged use, the glasses selected under the new mydriatics were nevertheless shown to be correct. In cases where under the subsequent use of the atropine a lower state of refraction was shown, the probability remained that a continued use of the first mydriatic would have given the same result. The sulphate of atropia was used in solutions of 4 gr.-f ℥ i; the sulphates of duboisine and hyoscyamine, 2 gr.-f ℥ i; the hydrobromate of homatropine in 6 gr.-f ℥ i.

Discussion.—Dr. JOHN GREEN remarked that in the class of cases which he met with, he was compelled to forego the use of atropia because of its liability to produce distinct conjunctival inflammation. With the introduction of new mydriatics he had hoped for the appearance of some agent which could be used without producing such reaction, but he had not yet found such a one. Dr. F. B. LORING, of Washington, said that it had become necessary to use in his city mydriatics the effect of which was very evanescent. Neither duboisia nor homatropia could be used there during hot weather, but why, he had been unable to determine. He had added the sulphate of zinc as suggested by Seely, of Cincinnati, and with very good results. He had also found that he could not use the nitrate of silver in hot weather. Dr. GREEN said that the addition of sulphate of zinc had not been of any service in his cases. Inability to use mydriatics was also much greater in summer than in cold weather in St. Louis. Dr. NORRIS had used hyoscyamia with great satisfaction. He was surprised to hear that these mydriatics had caused conjunctivitis. Dr. E. W. BARTLETT, of Milwaukee, said that formerly a great deal of conjunctival inflammation after the use of atropia was seen in his city, but since he had used Merk's preparations the difficulty had entirely disappeared. Dr. S. C. AYRES, of Cincinnati, had been using homatropia for several months in examining the refraction, and had found it exceedingly satisfactory. He had seldom seen conjunctivitis produced by it. He thought it important, however, that the solution should be freshly prepared every two or three days. Dr. WADSWORTH, of Boston, had rarely seen conjunctivitis produced by mydriatics, even though they were used continuously for a long time.

Dr. KIPP read a report of two cases of **sarcoma of the choroid** presenting unusual clinical features. Case 1 was seen several years ago. The patient was a woman in good health and 44 years of age. Failure of vision was first noticed three or four months before she came under observation. She had never received an injury to her eye, but had often been beaten on the head by her husband. She had barely perception of light. *Tn.* The anterior parts of eye were normal. Temporal half of vitreous chamber was occupied by a semi-spherical tumor, the summit of which reached to visual axis. The tumor commenced a short distance posterior to lens, was of a uniform yellowish-red color, and was smoothly covered by the transparent retina, the vessels of which were of normal color and calibre. At lower anterior angle the retina was detached. In temporal half retina and choroid were apparently normal. The case was lost sight of after a few visits.

Case 2, also a very stout healthy-looking woman, 46 years of age. Noticed floating particles in eye seventeen years ago. During last year her sight has become greatly impaired. No pain. Can see large letters when held close to and to the left of the eye. *Tn.* The anterior parts of eye were apparently normal. Lens transparent. The nasal half of vitreous chamber was filled with a semi-globular mass which projected to visual line. Tumor was of color of choroid, as seen with ophthalmoscope, and was smoothly covered by the transparent retina. In lower part of eye retina was detached but transparent. Eye was enucleated. Microscopic examination showed tumor to be a melanotic sarcoma. The cases were thought worthy of report as they showed that a choroidal tumor can attain a very large size without causing increase of tension and total detachment of retina. The picture presented by these cases resembled closely that of detachment of the choroid—as usually given in the text-books, except in tension.

Discussion.—Drs. GREEN, WADSWORTH, and H. D. NOYES had also seen large sarcomata of the choroid without total detachment of retina. Dr. J. F. NOYES, of Detroit, had had a case of this kind with extensive detachment of retina. He detected the sarcoma which presented itself as a bluish prominence, after having drawn off the subretinal fluid with a hypodermic syringe. Patient did not consent to enucleation till some months later, when the retinal detachment was greater than before. The tumor was of the size of a large pea, and was situated perhaps ¼ inch to the outside of optic nerve. It was a spindle-celled sarcoma.

Dr. THEOBALD, of Baltimore, read a paper entitled, **what constitutes insufficiency of the internal recti muscles?** The frequent disappearance of asthenopic symptoms, which were supposed to be due to insufficiency of the internal recti muscles, the existence of which had been demonstrated by the von Graefe's test, without any apparent diminution in the apparent insufficiency, and the contradictory character of the results obtained in many cases from the different tests recommended by von Graefe, suggested doubts as to their trustworthiness, and prompted the inquiry, whether, even in emmetropia, and with accommodation perfectly regulated, a considerable relative divergence of the visual lines might not occur, as an accompaniment of vertical diplopia, and still no actual insufficiency of the internal recti muscles be present. To determine this point, twelve strong-eyed, non-asthenopic persons, whose eyes were constantly em-

ployed in near work, were examined for insufficiency of the internal recti muscles by von Graefe's vertical diplopia tests, the precautions suggested by the writer in 1874 to insure accurate accommodation for the test object, and to prevent confusion from overlapping of portions of the vertically separated images (the substitution of a star for the round dot used by von Graefe, and the shortening or omission of the vertical bisecting line) being observed in making the examination. Five of the persons examined were emmetropic, five slightly hypermetropic, and two myopic. With the test object at 12", and slightly below the level of the eyes, every one of the former exhibited relative divergence of the visual lines, showing apparent insufficiency of 2°, 3°, 5°, 8°, and 11°, respectively; while even the hypermetropic, without neutralizing glasses, showed apparent insufficiency in three instances—3° being associated with Hm $\frac{1}{60}$, and 2° in one instance, and 6° in another, with Hm $\frac{1}{48}$. With M $\frac{1}{10}$ 22° of apparent insufficiency was discovered, but this, as might be expected, was much reduced (to 2°) when the test was repeated with neutralizing glasses. Such being the case, how are we to determine the existence of true insufficiency of the interni? The difficulty occurs chiefly in dealing with the slighter degrees of insufficiency. The writer was not prepared, to say where the line should be drawn between sufficiency and insufficiency, whether at eight, or at eleven, or at twelve, or fifteen degrees of relative divergence; he was convinced, however, that the tests proposed by von Graefe, as he believed they were usually understood, "are calculated to lead to erroneous conclusions regarding the strength of the internal recti muscles; and that to prevent this it is necessary, not only to take into consideration the state of refraction, to be sure that the accommodation is properly regulated, and to be careful that an incentive to binocular fixation does not arise through overlapping of portions of the vertically separated images, but, in addition, to recognize the fact that relative divergence of the visual lines, even of considerable degree, occurring in connection with vertical diplopia, and, after these several precautions have been taken, does not necessarily indicate insufficiency of the internal recti muscles, or, at least, that it is not incompatible with entire freedom from functional disorder."

Discussion.—Dr. WADSWORTH thought that nine out of ten patients, with or without asthenopia, had insufficiency of the interni, varying from 2° to 10°; 5° or 6° was ordinary, and to it he attached no importance. Dr. ROOSA concurred in this opinion. Dr. GREEN had seldom used prismatic glasses, and then only when positive diplopia existed. He had not been able to satisfy himself that there was any trustworthy test of insufficiency of the interni. Dr. RISLEY was surprised at the frequency with which insufficiency of the interni had been met with by some of the gentlemen who had spoken. He had kept a careful record of all his preliminary examinations, and he thought that in not one half of the patients had he found lateral deviation. With reference to its clinical importance, when found, he thought that some persons could carry only from 1° to 6° of insufficiency, whilst others might have from 10° to 12° and experience no discomfort. Dr. G. HAY, of Boston, uses as a practical test divergent prisms set in glasses, in addition to convex glasses. Dr. H. D. NOYES had been as careful in his examination as Dr. Risley, and out of 1800 recorded cases he had set aside 250 as muscular asthenopia, having sufficient trouble to cause note, if not treatment. He was very positive that such a condition as latent insufficiency

of ocular muscles existed, and had over and over seen cases in which the muscles would not at first exhibit their full amount of weakness, more frequently the interni than the externi. As to the value of v. Graefe's test, the dot and vertical line, he had abandoned its use. As to the clinical insignificance of insufficiency, he had used prisms with the greatest positive advantage. He had operated in probably fifty cases for pure insufficiency of muscles, and in only two or three cases was the operation not followed by marked and satisfactory results. An insufficiency of 8° he regarded as worthy of note, possibly it needed prisms. Dr. WADSWORTH believed that there was a number of cases in which prisms were beneficial, but that they were not to be determined by the insufficiency shown by v. Graefe's test, and in a vast majority of cases in which an insufficiency of 8°, as ascertained by that test, existed, no prisms were required. Dr. ROOSA did not wish to leave the impression that he did not use prisms. He simply wished to express the opinion that most ophthalmologists in New York attached less importance to insufficiency than they did ten years ago.

Dr. S. D. RISLEY, of Philadelphia, read a paper on **weak eyes in the public schools of Philadelphia.** The number of eyes examined was 2422. The scholars were divided in grades of 8½, 11, 14, and 17½ years of age. Amongst the conclusions are the following:

Myopia, commencing in the primary classes with a low percentage (4, 27 percent.), steadily increases as the pupils pass to the highest class; that the percentage of increase is very much lower in the schools in Philadelphia than in Europe; that the myopic eye presents a higher percentage of disease than eyes with emmetropic or hypermetropic refraction; that even in myopic eyes the percentage of disease is much higher when astigmatism is also present; that hypermetropic eyes are more numerous than both myopic and emmetropic combined; that, next to myopic astigmatism, distinct lesions are most prevalent in eyes with hypermetropic astigmatism; that the increase in myopia is from eyes with already existing anomalies of refraction; that, given an emmetropic eye, and the probabilities are that no harm will come to it from the educational process; on the other hand, given an eye with an anomaly of refraction, especially astigmatism, and other things being equal, the probabilities are that the educational process will be fraught with pain and danger to the eye; that the probability of harm resulting from school-life diminishes with every added year of age, in all states of refraction.

Dr. F. BULLER, of Montreal, reported a case of **sudden and complete blindness after large doses of quinine.** A lady, æt. 32, of good constitution and previously in excellent health, five days after an uncomplicated labor, was seized with symptoms indicative of septicæmia; there was great febrile disturbance, to combat which quinine was given in twenty-grain doses, morning and evening, for two days. After the second or third dose she complained of tinnitus aurium and some hardness of hearing, with intense headache. The second night, *i. e.*, after the fourth dose, she was delirious, and took 30 or 40 grains of chloral. The third day, still high fever and headache, took three 20-grain doses of quinine, and another large dose of chloral at night to allay active delirium. On the fourth day, was found to be totally blind, and both physically and mentally much depressed, but with little or no fever; in a word, convalescent.

The eyes presented a normal appearance, except that the pupils were widely dilated and did not respond to light. Facing the brightly burning lamp, or the bright sky, she had a faint sense of light. Both eyes alike. The ophthalmoscope showed almost normal nerves and retinal blood-vessels, but a turbidity or diffuse bluish-gray opacity of the retina, most marked around the macula, which, by the direct method, had the appearance of a cherry-red spot about 1‴ in diameter. Four leeches were applied to each temple, and an additional quantity of blood taken by means of the artificial leech applied to the leech bites. Inunction of mercury, 3 i, morning and evening, until the gums began to show its effects. Afterward, iodide of potash was given in considerable doses for several weeks, also an injection of pilocarpine each evening for the first three days. After probably about 60 hours of complete blindness, began to have "telescopic" vision, getting occasional glimpses of a clock dial across the room. On the fourth day of the blindness, the pupils were less dilated and responded feebly to light. The retinal opacity was decidedly diminished. On the fifth day, could count fingers at from 1 foot to 20, or more distant, and could distinguish colors red and blue. Visual area widening. On the sixth day, at 15 feet distance, had a visual area of about 2½ feet in width. On the eighth day, could tell all colors in a subdued, but not in a bright light; vision still further improved. Now for the first time the retinal blood-vessels were found to be much diminished in calibre, especially the arteries, and the optic nerves pale. On the ninth day, the retinal vessels were less than half their normal dimensions. Paracentesis corneæ performed, and the wounds reopened in the evening; opacity of retina scarcely perceptible; inhaled 5 doses of amyl. Tenth day, vision and visual field improving, able to read J. 8 fluently, but blood-vessels of retina still smaller. Inhalation of amyl, which was continued daily for several weeks, as the patient felt sure it improved her vision. On the twelfth day, complained of photopsia and chromatopsia. The nerves look decidedly atrophic. Six weeks after the date of blindness could read J. 4 fluently at 18″ distance; each visual field seemed to be about 1 foot in diameter. The peripheral position of the retina appeared slightly turbid and striated. After eight weeks had elapsed, could read J. 2 fluently; nerves very pale, and blood-vessels small as they have continued ever after; strychnine injections were tried, but had to be abandoned on account of the headache and "nervousness" they induced. At the end of eleven weeks, the visual field of L. E. at 14″ measured: upward 8″, downward 9″, inward 8″, outward 12″, with a faint perception beyond the limits. V—$\frac{10}{10}$; could distinguish all colors at centre only, and was much troubled with vivid after-images. Any circular object had the appearance of spinning round rapidly, giving a sense of giddiness when looking at such objects,—for instance, a dinner plate. A picture with a black frame gave a painfully vivid after-image of the picture, with a brightly luminous gold-colored frame. A room lighted by artificial light looked very dim, except just around the lights. Two years later vision was practically perfect, $\frac{20}{10}$, with unimpaired accommodation, normal and active pupils, perfect central perception of colors, but absolute peripheral color-blindness. Ophthalmoscopic changes identical in each eye; nerves very pale; veins ½, arteries less than ½ normal calibre, some of them with white borders for a short distance; none could be traced to ophthalmoscopic periphery. Photopsia and chromatopsia only troublesome occasionally when suffering from "nervous headache"; darkening the room did not produce any

unusual diminution of vision. She herself notices the defect of vision chiefly between sundown and dark, scarcely at all during daylight, or in a well-lighted room at night. The writer regards this case as having been one of retrobulbar perineuritis, and adduces several reasons in support of this theory, but he is of the opinion that the condition was, in some way as yet unexplained, the direct esult of cinchonism.

Discussion.—Dr. GREEN thought that with the grave complication in Dr. Buller's case—threatened septicæmia in a puerperal woman—it was hardly justifiable to exclude the possibility that the condition of the eyes was due to the disease as much as to the remedy employed. His experiences in the West and South had led him to look with extreme doubt upon the reported cases of optic-nerve lesion, or blindness, attributed to quinine poisoning. He believed such cases to be very rare. Dr. ROOSA did not think that the eye trouble was caused by septicæmia. Cases of quinine amaurosis might be exceedingly rare, but he had no doubt of their occurrence.

Marked narrowing of the field, with diminished acuteness of vision (glaucoma ?) following the use of duboisia, presumably due to the use of that drug, was the title of a paper by Dr. J. P. WORRELL, of Terre Haute, which was read by Dr. Green.

Dr. HARLAN reported a case of **intermittent concomitant convergent squint.** The patient was a boy, 3 years of age, apparently in good health. The squint first appeared occasionally, when he was aroused from his afternoon nap, but soon became regularly intermittent in the tertian type. One day the eyes would be perfectly straight, and on the next morning the child would awake with a convergent strabismus of about 4‴ in the right eye. Under repeated ophthalmoscopic examination with atropia, the refraction seemed nearly, if not quite, emmetropic, and no source of irritation could be discovered. The regularity of intermission continued with great exactness for more than a year, when it was suddenly broken by the appearance of the squint on an "off day." Since then the intermissions have been irregular, and have become less and less frequent, until at present, three years after the commencement of the affection, they are rare and doubtful. The squint, however, varies greatly in degree. The child had no chorea.

Dr. ROOSA reported a case of **concussion of the eyeball by a bullet.** The bullet struck just over the lachrymal sac, passed over the nose, across the cheek, and lodged about the glenoid cavity. The injury was not followed immediately by loss of vision. The patient first noticed impairment of direct vision, and at last examination could see only peripherically $\frac{1}{100}$. The eye was myopic; crossed diplopia. The retina was found to be opaque in the region of the macula. It did not seem to him possible that a foreign body was in the eye. Of course there was some doubt whether the diplopia might not have existed before the injury, but as to the changes in the retina, there was no mistake. He regarded it as a case of concussion of the retina, but whether or not the paresis of the third nerve had the same cause, was doubtful.

Discussion.—Dr. NOYES, of New York, had seen a man who was struck on the side of the head. There was no external injury, yet the result was atrophy of the optic nerve upon the other side. He had also seen a gunshot injury

over orbit, and although there was no external wound, there was atrophy of choroid, as well as optic-nerve atrophy.

Dr. WADSWORTH, of Boston, read a paper on **neurotomy of the optic and ciliary nerves,** in which he gave detailed histories of 15 cases. The operation was performed in the usual way: the internal rectus was detached, the optic nerve divided close to globe, the posterior pole turned forward, and the posterior half of the globe, as far as the equator, carefully and thoroughly denuded. In only one of the cases was the operation followed by marked exophthalmos. In only one of the cases was the operation performed for sympathetic trouble; in all the others for the relief of pain. The sympathetic irritation subsided. In one of the other cases ciliary tenderness returned, although the cornea remained anæsthetic. This eye was enucleated. Microscopic examination failed to show disease of the ciliary nerves. In another case ulceration of cornea followed, but the cornea healed with firm cicatrix. Of the 15 cases four had transparent cornea, and in all of these it remained anæsthetic. In all the other cases the cornea was vascular, and in all of these sensitiveness returned, in one as early as the third day. It is supposed that in these cases conjunctival nerves accompany the vessels. In all of the cases the eyeball became somewhat atrophic. The mobility of the eye remained good in all cases.

Discussion.—Dr. BULLER mentioned the case of a child, in which panophthalmitis followed neurotomy. Dr. NOYES, of New York, had performed the operation a number of times, and in the majority of his cases it had been successful. At the same time, his own feeling had been that it was of doubtful propriety. He had seen sensitiveness of the cornea return when it was not vascular. He had also seen shrinking of the globe to an extent which set entirely aside the cosmetic advantages of the operation, and he had been in doubt as to the protection it offered against sympathetic inflammation in the other eye.

Dr. GREEN spoke of the use of **pilocarpine in photophobia and strabismus.** He had used a one-half-per-cent. solution of Merk's preparation in such cases with benefit.

Dr. THEOBALD had used this drug with good results in cases in which eserine had been more especially recommended. He has used a two-per-cent solution.

Dr. NOYES, of New York, spoke of a case of **alleged cure of cataract by electricity.** Prior to the electrical treatment he had had an opportunity to examine the eyes, and then found incipient cataract, a few striæ with diffused haziness of lens, slight choroidal changes, and vision $\frac{20}{70}$ in one eye, and $\frac{20}{100}$ in the other. The patient was a lady, 70 years of age. Twenty months after this examination, during which time she had been cured, as was said, he had an opportunity to examine her again. He found extensive atrophy of choroid; vision $\frac{20}{100}$ in one eye, and $\frac{20}{200}$ in the other. The case doubtless was one of subacute choroiditis, with peripheral opacity of lens, and the condition which gave hazy vision was haziness of vitreous, which cleared up under hygienic treatment and the use of electricity.

Dr. NOYES also reported a case of **pulsating exophthalmos,** which differed in its history and treatment from any case on record. A girl, four years ago, after some severe form of fever, was suddenly taken with pain in the left side of her head, and about the left eye; the globe began to protrude, and within

one week there was marked exophthalmos, without inflammatory disturbance. For four years the condition of the eye remained substantially unchanged, except that she had occasional attacks of fugitive inflammation. While passing through Dublin, on her way to America, she had a very severe attack of inflammation of that eye, for which she was treated with sulphate of copper. On her arrival in New York she came under his observation. He found swelling of the lids, considerable ecchymosis, but no trachoma. There was marked protrusion of the globe, and at the inner and lower angle of the orbit a projection was felt, which at first seemed to be a solid growth. Pulsation, however, was felt, and an operation was proposed. Examination under ether showed the tumor to be a distended blood-vessel, which came from the orbit forward, and returned upon a loop. A bruit was heard over the exophthalmos, but not upon the temple. Pressure upon the carotid completely stopped the pulsation, but had no effect on the protrusion. From this he concluded that it was a purely vascular anomaly, and not wishing to perform so grave an operation as ligation of the carotid, and not being clear with reference to diagnosis, he decided to ligate the angular artery, and to dissect down to the enlarged vessel, and tie it off. With great difficulty he succeeded in ligating the angular artery. Then dissecting up the protruding vessel, which was as large as a good-sized lachrymal probe, he traced it down, placing one ligature after another on the vessel, and cutting between them. He demonstrated that it was a vein, which he finally ligated at the spheno-maxillary fissure. He then concluded that it was the anterior orbital vein, coming out of the spheno-maxillary fissure, and going back to empty into the cavernous sinus. The wound healed kindly; at the end of six weeks the exophthalmos had disappeared.

Dr. GREEN referred to the advantages which Snellen's clamp, with both blades alike and used as a forceps, affords in his **operation for entropion.**

Dr. PROUT had found special advantage in using a probe-pointed knife instead of scissors in this operation.

Dr. H. D. NOYES mentioned two cases of **extensive epithelioma** at the inner angle of the orbit, in which he had transplanted a flap from the forehead, and in order to prevent the pedicle from wrinkling, had cut away sufficient skin from the top of the nose to give room for the broad pedicle. This modification had been followed by very gratifying results.

REPORT ON THE SECTION OF OPHTHALMOLOGY AT THE INTERNATIONAL MEDICAL CONGRESS, HELD IN LONDON FROM 3D TO 9TH AUGUST, 1881.

By H. KNAPP.

The ophthalmological section of this memorial Congress was, in every respect "a great success." A long list of papers presented by eminent men from all parts of the civilized world, an appreciative and competent audience of from 40 to 80 members at every meeting, lively discussions evidently prompted by none but scientific motives, a free exchange of personal good-will and mutual assistance, and the whole presided over by a president, WILLIAM BOWMAN, who is held in the highest esteem and, I dare say, is loved by whoever has had the privilege of making his acquaintance or only knows him from his works, which is to say by all oculists without exception, and a multitude of physicians cultivating other departments of medicine. His introductory address gave a rapidly drawn picture of the present aspect of ophthalmology,—of which the Transactions would furnish a photograph to our absent friends and to posterity,—pointing out, in particular, the subjects proposed for discussion, mentioning, in an admirably non-committal manner, the different sides of every question, so as to elicit free expression of all opinions. To aid those who were not polyglot, abstracts of the papers to be presented were printed in English, German, and French. A part of these official abstracts may conveniently be used in the present report, and will be distinguished by quotation marks. There were no reporters for the Transactions, but a rule was followed, which appears so eminently practical as to recommend itself for adoption to every society, namely: "To insure accuracy, and facilitate the publication of the proceedings, speakers are requested before the conclusion of each meeting to hand to the Secretaries of the Section, in writing, the substance of their speeches. Unless this rule be carried out, the discussion cannot appear in the Transactions."

The Secretaries handed to every speaker, as soon as he sat down, a sheet of pasteboard to which a pencil was attached by a string, and some writing paper with the above rule printed at the top.

Five subjects had been proposed for discussion by the Committee, and several gentlemen had been asked to introduce them by papers. These subjects, and the papers and discussions in connection with them, preceded all other communications, and were not limited as to time, whereas only from five to fifteen

minutes severally were allotted to the others, and that was at the end of each day, when mostly no more than half an hour was left, and everybody was tired. This prevalently English mode of arrangement brought out, it is true, a full expression of opinion on certain questions, but afforded an insufficient hearing to the spontaneous original communications.

The first official subject for discussion, **the antiseptic method in ocular surgery,** was introduced by Prof. HORNER, of Zurich.

"The experience of oculists and of surgeons shows that small differences in the size and shape of the wound, and in the patient's age and constitution, are less important than the mode of dressing. An exact analysis of all the cases of primary suppuration after extraction leaves no doubt that it depends on infection. On this account we ought to be able to get better results by antisepsis. For this purpose there is required:

"1. The prophylactic disinfection of the patient, instruments, sponges, operator, assistants, etc. Special attention has to be paid to the region of the operation (asepsis of the lids, conjunctiva, and lacrymal sac) as well as to the operating-room, if the presence of pathogenic bacteria is suspected (large hospitals, erysipelas, diphtheria, etc.).

"2. The antiseptic cleansing of the conjunctival sac after the operation.

"3. Antiseptic treatment in the event of commencing suppuration: disinfection of the conjunctival sac by irrigation, disinfection of the incision and of the anterior chamber, reopening of the wound so as to accomplish the asepsis. Antiseptic bandage."

Horner has abandoned the spray, but uses a five-per-cent solution of carbolic acid for cleansing; applies the wet salicylic bandage (five per cent. salicylic wadding), which can be easily removed, and covers the whole region of the eye. When irritation or suppuration is present, he pours a two-per-cent. solution of carbolic acid into the conjunctival sac, opens the wound, and removes the products of inflammation from the anterior chamber. Aside from the antiseptic method, H. dwells upon the importance of the most delicate execution of the operation in all its details.

Dr. REYMOND, of Turin: **Lister's dressing in extraction of cataract.** "Unless the method is perfectly carried out, the dressing extended far beyond the orbital region, and very accurately applied, we often have: (1) striped keratitis, (2) whitish infiltration of some parts of the border of the flap, (3) a grayish, felt-like, fibrillary mass forming in the wound and spreading to the pupil. In 380 extractions since January 1, 1880, the author has had primary sloughing of the cornea in seven patients, of whom four had taken off the bandage themselves before the third day." He speaks at length on the reaction of the conjunctiva: "Toutes ces formes s' associent à une espèce de catarrhe conjonctival gélatineux, parsemé de points grisâtres, et qui peut devenir assez dense pour former une pseudo-membrane croupale," etc.

Prof. THEO. LEBER, of Göttingen: **On the action of foreign bodies introduced into the interior of the eye.** Asking how much is to be ascribed to the foreign body and how much to contamination, L. comes to the following conclusions:

"1. Foreign bodies which are clean, and which exert no chemical action, do not cause any inflammation in the interior of the eye.

"2. Clean fragments of oxidizable metals—*e. g.*, iron, steel, copper—do not cause purulent inflammation, but many other phenomena which seriously compromise the functions of the eye, especially contraction of the vitreous and detachment and atrophy of the retina.

"3. The entrance of metallic fragments into the interior of the human eye is usually followed by purulent inflammation, just as in experiments made without antiseptic precautions upon animals. This inflammation is always due to the action of germs which have entered through the wound.

"4. Certain chemical substances—*e. g.*, arsenic, binoxide of mercury, croton oil, etc.—when introduced into the interior of the eye are capable of setting up purulent inflammation, which is quite independent of the action of germs.

"5. The extracts of septic liquids, in which the germs have been killed by boiling, set up a transient inflammation when injected into the anterior chamber or into the corneal tissue. These experiments favor the hypothesis that the phlogogenic action of the germs depends on the production of chemical substances which act on the vessels.

"6. Cysticerci may also set up purulent inflammation in the eyeball, due perhaps to an irritating secretion from these entozoa."

Dr. EMMERT, of Berne, made a communication on the frequency of infectious disease of the eye at different periods of the year, including ophthalmia neonatorum, diphtheritic conjunctivitis, and hypopyon-keratitis. His conclusions are based upon the returns of statistical inquiries obtained from about thirty ophthalmic institutions. Ophthalmia neonatorum is most frequent in May, diphtheritic conjunctivitis in January, and hypopyon-keratitis in August.

Discussion.—Dr. DE WECKER, of Paris, is an advocate of the antiseptic method, uses spray and antiseptic dressing in extractions. The results of two years have been varying: in the first he had only one suppuration among 250 extractions, then six among the 150 extractions following.

Dr. WARLOMONT, of Brussels, recommends antisepsis only when infection is present.

Prof. GAYET, of Lyons, has used antiseptic dressing with phenic acid for two years. The results have not been brilliant. He recommends the antiseptic method, but considers phenic acid as bad and dangerous, in which opinion Horner also concurs.

The writer of this report said that a close observation of the reactive processes after extraction, which almost invariably started from the corners of the wound—parts which were most exposed to bruising and incarceration, but least to infection—had always kept him on the reserve when a paramount importance was ascribed to the antiseptic method. Without resorting to antisepsis he has not seen suppuration follow any operation on the eye for two years and a half, until last spring, when three cases occurred, one after sclerotomy in hemorrhagic glaucoma, and two after extraction. Everybody has experienced such variations. The antiseptic method cannot yet boast of controlling suppuration and plastic inflammation.

Dr. H. PAGENSTECHER, of Wiesbaden, declared himself a warm adherent of the full antiseptic method. He uses carbolic acid, and fears no longer the suppuration from prolapse of vitreous, which formerly occurred at times after extraction with the capsule.

Prof. DOR said that in certain cases, for instance in dacryocysto-blennorrhœa, everybody uses, or ought to use, antisepsis. The extent to which this should be done in general, and the best substances to be employed, are yet to be determined. The spray seems to be abandoned.

The CHAIRMAN, in closing the discussion, said that whatever opinion anybody might hold at present, sure it was that the subject of antisepsis would, for the next years, occupy the minds of all ophthalmic surgeons. He would add that Lister thinks the oil of eucalyptus particularly adapted to the conjunctiva and both an innocuous and sufficient antiseptic in ophthalmic practice.

Dr. LANDOLT, of Paris, read an interesting paper on the **motor affections of the eye.**

"To establish a rational and efficacious treatment of the motor disorders of the eyes (paralytic and non-paralytic strabismus, etc.), it is necessary to study the fields of monocular and binocular fixation and the angle of the strabismus.

"These measurements are made by means of a perimeter, the head being fixed by a tooth-plate, and by the aid of the divisions into tangents on a wall, as indicated by the author.

"The treatment, far from being exclusive, should consist in the systematic combination of all suitable means—lenses and prisms, electricity (in paralytic cases), orthopædic treatment, operation (tenotomy, or advancement of the muscle), general treatment."

He showed many charts of anomalies of the field of fixation. This graphic method illustrates in a comprehensive manner not only the quantity of the muscular forces and their deficiencies in any given case, but also the course of the recovery, and, with the necessary precautions in reasoning, the effect of the remedies.

Dr. ABADIE, of Paris, recommended **partial tenotomy** in muscular insufficiency. It can be graduated at pleasure. He separates first the upper then the lower edge of the tendon, leaving its centre. More can be cut, even on the following day, if the effect prove too small. In this way the operation can safely be performed at the beginning of progressive myopia, and the development of high degrees prevented.

Prof. JAVAL, of Paris, exhibits a very ingenious, but complicated and excessively expensive **optometer**, consisting of three superposed discs of about 30 *cm.* in diameter, each carrying at its periphery a set of glasses, the one the positive spherical, the other the negative spherical, the third the cylindrical, which, by a toothed wheel, are turned on a central axis, so that each cylindrical glass can be presented before the peep-hole, with the axis in any direction.

His and Dr. SCHIÖTZ's **new ophthalmometer** replaces the plane-parallel glass plates of Helmholtz—which lead to errors when the observer is astigmatic—by a Wollaston's (double refracting) prism. He obtains "the asymmetry of the cornea in a few moments without calculation; a single adjustment of the instrument, a single rotation, and a single reading are enough."

JAVAL adds some important remarks to the demonstration of these instruments, viz.: the total astigmatism of the eye is greater than that of the cornea; the astigmatism of the lens is homonymous with that of the cornea. Accommodation diminishes the astigmatism. Astigmatism may be latent. When people grow older their astigmatism is more pronounced. Insufficiency of the internal recti is mostly caused by anisometropia and astigmatism.

The second subject for discussion, **the nature of sympathetic ophthalmia and the mode of its transmission,** was introduced by Prof. H. SNELLEN, of Utrecht, who arrives at the following conclusions:

"1. The explanation of sympathetic ophthalmitis as a reflex action of the ciliary nerves is insufficient.

"2. As a clue to further research, the hypothesis recommends itself that sympathetic ophthalmitis is to be regarded as a metastatic specific inflammation, in which special parasitical inflammatory elements are conveyed over to the choroid of the sympathizing eye through the dilated lymph-paths."

Dr. W. A. BRAILEY, of London, then read a paper **on the pathology of sympathetic ophthalmia.**

"The uveitis, which is so strikingly manifest in the well-marked and severe cases of this disease, presents certain definite pathological characters by which it can be distinguished histologically from other forms of inflammation.

"These characters, though they differ a little at different parts of the uveal tract, are nearly always recognizable in both eyes.

"Though in the sympathizing eye the disease often, as is well known, begins as an iritis serosa, with accompanying keratitis punctata, yet here also the peculiar characters of sympathetic ophthalmitis usually become visible at a later stage.

"The disease is not transmitted from one eye to the other, by the passage of structural changes along either optic or ciliary nerves."

Dr. PONCET, of Cluny, then read a paper:—**How can sympathetic ophthalmitis be produced after enervation?**

"In an eye enucleated after enervation, for sympathetic mischief, examination showed changes of unusual intensity, due to optico-ciliary neurotomy.

"The intra-ocular nerve-bundles showed fatty degeneration. The scar-tissue produced by the enervation formed a fibrous mass, very dense, and containing many of the peripheral ends of the ciliary nerves. These nerves were affected by interstitial sclerosis with irritative compression of the nerve fibres. The permanence of the sympathetic pains must be attributed to this lesion.

"Terminal neuritis of the ciliary nerves perhaps exists also in those cases where enucleation does not prevent sympathetic mischief."

Dr. MOOREN, of Düsseldorf, made some eloquent remarks on **sympathetic ophthalmia.** Twenty-one years ago he described a case of inflammation of the optic nerve, produced by bruising with a pair of scissors. It was followed by sympathetic ophthalmia. Dr. Colsman enucleated an eye. Three days later sympathetic neuritis optica followed in the other previously healthy eye. He cited other similar cases, then quoted Dr. A. ALT, who, of 113 eyes removed for causing sympathy, found, on microscopic examination, 73 affected with inflammatory changes in the optic nerve, whereas the ciliary nerves were healthy.

Prof. GRÜNHAGEN, of Königsberg, spoke of the experiments of GESSNER. Cauterization of the cornea was followed by the appearance of pus and fibrine in the anterior chamber of the same eye, and by the appearance of fibrine and white blood corpuscles in the anterior chamber of the other. This was caused by reflex irritation. He used for his experiments rabbits and cats, which were first curarized.

Drs. SNELLEN and LEBER have tried to produce sympathetic ophthalmia experimentally, but never with even a trace of success.

Dr. SAMELSOHN, of Cologne, thinks it possible that the sympathetic process travels from the choroid along the vessels which perforate the sclerotic, and creeps on through Tenon's capsule and the supravaginal space.

Prof. PFLÜGER, of Berne, has seen sympathetic ophthalmia follow neurotomy.

Dr. BOUCHERON stated that the cornea may retain its sensibility when all the ciliary nerves are cut. This is owing to recurrent fibres from the supra- and infra-orbital nerves. Ranvier found the stumps of several nerves inflamed.

Prof. PANAS, of Paris, related two unsuccessful cases of enervation: in the one, a child, death from meningitis; in the other, suppuration of the eye ensued.

The progress of the discussion, which was closed by Dr. SNELLEN, showed that, not repeating his opinion, all imaginable ways were alleged as being capable of transmitting the affection from one eye to the other: a neurosis by reflex action, a real inflammation propagated through the optic nerves, the lymphatics, the blood-vessels, the lymph spaces, etc.

Dr. LIBBRECHT, of Ghent, spoke on the examination of railway and marine officials as to color-blindness and impairment of vision, and thinks the examinations ought to be made by experts.

Dr. OLE BULL, of Christiania, showed a plate and made some remarks on **a new method of examining and numerically expressing color-perception,** which appears ingeniously conceived, practical, and expeditious.

"The method is based on producing the four principal colors of an equal intensity and shade.

"From among the different hues of these colors the author has, for blue, chosen that which, mixed with uncolored light, appears blue or colorless. A yellow, complementary to this blue, and of a like shade and intensity, is then produced. A red and a green have been chosen, which at the periphery of the retina appear either of their real colors, or colorless. Such a hue of this red and green is then chosen as to give, when mixed in equal parts, an indifferent gray, of the same shade as that given by the mixture of blue and yellow above referred to.

"From these four colors, six fainter tints are derived by mixing up on Maxwell's disc the single color with uncolored (gray) light of the same shade as that given by each pair of the two complementary colors mixed together. The relative intensity of these tints can be expressed by indicating the number of the degrees of the colored sector, namely, 40°, 60°, 80°, 120°, 160°, 240°. These tints are fixed by imitating them with pigment, and then—together with the four principal colors—painted on a black plate in squares.

"A patient's color-sense may be examined with this plate simply by pointing out any colored or uncolored square, and then asking him to indicate that square which appears most like it. If he is color-blind, he will make mistakes. If his color-sense is diminished by disease, both the kind and the degree of the defect may be detected. As the healthy eye at a distance of one metre from the plate can just discern the faintest tint—40°—a color-sense corresponding to this is taken as normal. If, *e.g.*, a patient can discern red only up to 80°, and green to 120°, he is beginning to turn green-red blind, and his perception of these colors may be expressed for the red by $\frac{40}{80}°$ and for the green by $\frac{40}{120}°$."

Concerning the **color question,** a committee was appointed by the Chair, consisting of representatives of different countries, with Prof. DONDERS as president

who, at a later meeting, submitted to the section a resolution that the propositions laid down at the International Medical Congress, held at Amsterdam two years ago, should be recommended as a basis for government legislation. The resolution was unanimously accepted.

Mr. HENRY EALES, of Birmingham, read a paper **on primary retinal hemorrhage in young men.**

"A form of retinal hemorrhage believed to be peculiar to young men, usually roundish and diffused, profuse, constantly recurring, peripheral in position, sometimes binocular, but most commonly in the left eye only, often causing complete opacity of the vitreous, and, when quite recent, of a venous color, seen to proceed from the venous radicles which are distended and tortuous. The hemorrhages are not associated with albuminuria, anæmia, gout, or other diathetic conditions, nor with any other obvious retinal disease ; but are invariably accompanied by slow pulse, constipation, epistaxis, headache, and loss of energy. They are believed to be due to a vaso-motor neurosis, probably inherited.

The third subject for discussion, **the relation between optic neuritis and intracranial disease,** was introduced by Prof. THEO. LEBER, of Göttingen, with an interesting paper.

"Optic neuritis in cerebral diseases is a true inflammation, not essentially different from other forms of papillo-retinitis, either in the character of the vascular congestion, or in the nature of the histological changes. It is, on the other hand, very different from the hyperæmia caused by venous stasis and the lesions which depend on it. This inflammation is not caused by stasis in the retinal veins from compression of the cavernous sinus, due to diminished intracranial space. It is not the result of irritation of vaso-motor nerves, caused by the cerebral affection. The optic nerve is the path of communication between the affection of the brain and that of the eye. An essential part in this transmission is taken by the effusion of a serous fluid forced into the subvaginal space of the nerve from the cranial cavity in which the pressure is increased. This fluid does not act by simple mechanical pressure, for its quantity is sometimes small ; probably it possesses phlogogenic properties.

"Intracranial tumors act as a sort of foreign body, provoking inflammatory congestion and hypersecretion of fluid (internal hydrocephalus). The same effusions are found in meningitis when it is followed by papillitis. The origin of papillo-retinitis in cerebral diseases may, then, be explained by assuming that the intracranial inflammation produces serous effusion, which passes into the subvaginal space, and exerts an irritating action on the papilla and its surroundings."

The mechanical theories are insufficient because compression of the veins does not produce choked disc, but only hyperæmia and œdema. Though the naked eye fails to detect inflammatory changes in the optic nerve, the microscope does, if the nerve is examined in its entire length. The view of a phlogogenic fluid passing from the cranium into the subvaginal space is supported by the recently published (*Graefe's Archiv*) experiments of Deutschmann, who injected tubercular substance into the cranium.

Dr. BOUCHUT, of Paris, read a paper on **the relation between ophthalmoscopic conditions and intracranial disease.** Though his publications

on this subject are well known, we copy the abstract, because it gives a concise statement of his present views.

"The author holds that all the important diseases of the brain and cord, as well as the serious diathetic diseases, may be recognized by ophthalmoscopic examination, and he applies the term cerebroscopy to this use of the method.

"Thus, congestion and swelling of the optic nerve indicate congestion of brain, meningitis, compression of brain, or commencing spinal disease. Œdema of disc and neighboring retina shows œdema of meninges and obstruction to circulation in the sinuses and meningeal veins, in tubercular meningitis, in acute and chronic hydrocephalus, in cerebral hemorrhage, in certain cerebral tumors accompanied by encephalitis, etc. Retinal varices and thromboses indicate thrombosis of the sinuses and meningeal veins. Miliary aneurisms of the retinal arteries show miliary aneurisms of the brain.

"In fevers and diseases of the nervous system retinal hemorrhages indicate either compression of the brain by a copious effusion, hemorrhagic diathesis, cardiac obstruction to the cerebral circulation, or changes in the cerebral and retinal vessels caused by chronic albuminuria, glycosuria, syphilis, and leucæmia. Miliary tubercles of the retina and choroid show tuberculosis of the brain or meninges. Lastly, in nervous diseases, atrophy of the disc or sclerosis of the optic nerve always indicates a disseminated sclerosis of the brain or of the anterior columns of the cord."

Dr. GALEZOWSKI, of Paris, spoke on embolism and thrombosis of the retinal vessels.

Dr. SAMELSOHN, of Cologne, on **the pathological changes in retro-bulbar neuritis (central amblyopia).**

"The anatomical condition of the disease described as central amblyopia is a true retrobulbar neuritis. This neuritis is essentially a primary interstitial inflammation, with consequent shrinkage and descending pressure-atrophy. This interstitial neuritis appears to be localized at the canalis opticus. In typical cases this neuritis affects only the bundles of fibres which supply the macula lutea. These bundles do not run a straight course in the intra-orbital part of the nerve, but they decussate with other fibres in order to appear finally on the lateral aspect of the nerve. The inflammatory nature of the disease demands an energetic resolvent treatment."

These conclusions were based on the microscopic examination of a fatal case of which preparations were shown.

Prof. DOR, of Lyons, stated that **the perception of color was effected in the optic nerve and the brain, not in the retina.** This proposition was proved by the loss of color-perception in all conditions of extra-ocular atrophy of the optic nerve, and its preservation in disease and atrophy of the retina from intra-ocular causes, for instance, choroido-retinitis of different kinds.

Dr. HUGHLINGS JACKSON, of London, spoke of **optic neuritis as being one symptom only of brain trouble,** the appreciation of which was no more important than that of other symptoms, for instance, intense headache. It could be produced by cerebral disease only in an indirect way, and might, just as almost complete blindness, disappear again. Its early recognition was of importance.

Dr. PARINAUD considers **optic neuritis as a lymphatic œdema,** produ-

cing positive inflammation, but occurring only when there is hydrocephalus. Interstitial cerebral œdema is its primary cause. It is consecutive to many diseases.

Dr. STEPHEN MACKENZIE could confirm in one case the propagation of diffuse encephalitis to the optic nerve with the microscope, not with the naked eye.

Dr. KNAPP states in support of Prof. LEBER's views, that we frequently see the highest degree of exophthalmus from orbital tumors, and yet only hyperæmia and œdema in the optic disc and retina, true neuro-retinitis only when the tumor encroaches upon the sheath of the optic nerve, which is especially the case in periosteal growths situated near the optic foramen.

Dr. BRAILEY, of London, has found that orbital tumors may produce optic neuritis without implicating the sheath of the nerve.

Dr. KNAPP further states, in confirmation of Dr. H. Jackson's observations, that he has seen complete recoveries from optic neuritis not only as to restoration of vision, but also, in certain cases, restoration of the normal aspect of the disc. He recollects a young lady, coming from a phthisical family, who had headaches, nausea, vomiting, and marked optic neuritis, but perfectly recovered in the course of a year, and has been well these eight years. He further cites the occurrence of curable neuro-retinitis in cases of otitis media purulenta with extension to the brain, to which Dr. Kipp, of Newark, has called attention (*Archives of Otology*).

Dr. DIANOUX, of Nantes, read a paper on the **treatment of detachment of the retina by injections of pilocarpine,** referring to 16 cases, of which 6 were cured, 8 improved, 2 unimproved.

Dr. GEO. MARTIN has tried the same method in 8 cases without any result.

Dr. NIEDEN, of Bochum, Westphalia, read an interesting paper **on the pathogenesis and ætiology of the nystagmus of miners.**

"7,054 individuals were examined at the pit's mouth, while going to or returning from their work. Among these 296 (4.2 per cent.) were affected. Out of a total of 29,640 eye patients in general, the percentage of nystagmus was .55.

"Nystagmus occurs only in certain pits; that is to say, in those where the illumination is defective, and especially where the safety lamp is in use. Out of 117 cases encountered within the last two years, 107 (91 per cent.) had worked with this lamp. But where the naked light was in use the cases occurred only sporadically. It is important to notice the frequency of concurrent eye affections, which are met with in 38 per cent. of the cases. Also, of general disorders, which are found in about 45 per cent."

The fourth subject for discussion, **the nature and causes of glaucoma,** was introduced by Dr. ADOLF WEBER, of Darmstadt.

"The regulation of the interchange of fluids in the eye depends on the relative pressure of the fluids within and without the ocular blood-vessels. Permanent increase of ocular tension can be explained only by an excess of transudation into, over escape of fluids from, the cavity of the eye. These liquids pass through many filters, from the vitreous humor to the posterior chamber, by the pupil into the anterior chamber, and escape at its periphery to the exterior. Any obstruction at any point in this path causes retention of fluid behind it, and in such obstruction we find the first and only factor in the causation of glaucoma. To the full development of this condition, according

to hydrostatic laws, a second, negative, condition is required, viz., the non-occurrence of a compensation between the intravascular and extravascular pressure.

"The only invariable antecedent, and, in that sense, "cause," of glaucoma, is a progressive obstruction of the outlets of the intra-ocular fluids; the other antecedents, either alone or combined, cannot produce it.

"The clinical varieties of glaucoma depend on the seat, intensity, and extent of the obstruction in the efferent channels."

Prof. LAQUEUR, of Strasburg, has observed that the **refraction of glaucomatous eyes is increased by iridectomy.** Graefe mentions this fact in 2 cases. L. has seen it in 12. The increase is least in the prodromal stage, more in chronic, most in acute glaucoma.

Dr. PRIESTLEY SMITH read a paper on the **pathology of glaucoma,** in which he re-states his previously expressed theory of an increase of the so-called circumlental space. The theory is further supported by weighing the lenses with a delicate instrument devised for the purpose and exhibited before the section. He found that the lens increases in weight and bulk with advancing years. In two specimens of acute glaucoma "the margin of the lens pressed against the swollen ciliary processes."

Dr. ANGELUCCI, of Rome, stated that Bowman's membrane is a product of the corneal substance proper, Descemet's membrane, however, a product of the endothelium of the anterior chamber. Fontana's space is only the limit of the anterior chamber, traversed by adjacent tissues. Schlemm's canal is formed of veins with uninterrupted walls. In glaucoma he found the arteries sclerosed, their calibre diminished, the veins dilated and in a condition of chronic inflammation, compressing the lymphatic spaces and interfering with the outflow of the humors of the eye.

Prof. LEBER tested the current of filtration from the anterior chamber in glaucomatous eyes and found it much slower than in others. He mentioned the occurrence of glaucoma in aphakial eyes.

Dr. BRAILEY found in frozen glaucomatous eyes the lens rather smaller than normal, but it was also flatter. Iridectomy relieves the tension of the zonula, so that the surface of the lens becomes more convex again.

Dr. H. KNAPP, of New York, read a paper on the **extraction of cataract with peripheral division of the capsule.** In 166 successive extractions there were 90 per cent. of good success, 5 per cent. of moderate success ($S \frac{5}{100} - \frac{15}{100}$), and 5 per cent. of loss (3 per cent. of quantitative perception of light, 2 per cent. of total blindness). All eyes operated on were included in the statistics. He spoke of the operative procedure, showing a needle-cystotome with which a single horizontal, or perhaps still better, a **T**-shaped incision is made, described the ready mode of healing of the capsule, and dwelt on the necessity, innocuousness, and the advantages of a subsequent central division in at least 50 per cent. of the cases, as the completion of the method, showing a series of scalpel-needles for that purpose. He considered this operation indicated in all cases where extraction was proper, excepting degenerated hypermature cararacts which, on account of the frailty of the zonula, should be removed together with the unopened capsule.

The fifth subject of discussion: **the operations to be employed in the various forms of glaucoma,** was introduced by Dr. DE WECKER, of Paris.

"Sclerotomy will be eagerly resorted to in those cases in which iridectomy is known to be dangerous, viz.: in glaucoma hæmorrhagicum and congenitale, in simple chronic glaucoma, where the visual field is contracted nearly to the point of fixation, and whenever after an iridectomy the vision has deteriorated, or when the good result of this operation, after a period, begins to diminish.

"Shall we say that all glaucomas not amenable to iridectomy, are curable by sclerotomy? Unfortunately, no; for exceptional cases occur in which repeated sclerotomies, as well as subsequent iridectomy, are ineffective. Experience has taught us that a glaucoma simplex which has resisted sclerotomy, is not to be cured by iridectomy. We get the most striking results from iridectomy in acute glaucoma; and we can go so far as to say that the more acute the glaucoma, the more successful the operation is likely to be.

"Although in acute glaucoma we obtain also good results with sclerotomy, the difficulty in its execution, and the absence of any superiority in its remedial effects, are reasons which keep us from preferring it to an operation which, even when moderately executed, still yields excellent results.

"Another reason rendering sclerotomy less applicable is, that it is indispensable for its success that there should be a perfect contraction of the pupil under myotics, which forms the only guaranty against entanglement of the iris in the wound."

Dr. C. BADER, of London, has performed sclerotomy in all forms of glaucoma these four years. He thinks it superior to iridectomy. He favors and intentionally produces a prolapse of iris and a small staphyloma under the conjunctiva, makes the incision as subconjunctivally as possible, leaving no scleral bridge undivided. The results, he says, are most perfect; some patients operated on in this manner were presented.

Dr. ABADIE thinks sclerotomy indicated when the sinus of the anterior chamber is of normal depth, iridectomy when it is obstructed by pushing forward of the iris. He relates a successful sclerotomy for congenital hydrophthalmus in a child of one year. Considers sclerotomy totally devoid of danger. The section must be made very slowly. He uses von Graefe's knife, aims at preventing an immediate union of the wound. Certainly there are cases of glaucoma which yield to sclerotomy as little as to iridectomy. He recommends subcutaneous injection of ergotine the day before the operation.

Prof. LEBER read a communication from Prof. SCHÖLER, of Berlin, who, by way of experiment, had satisfied himself that iridectomy and cystoid scars do not facilitate the escape of the intra-ocular liquids. There are no filtration scars.

Mr. POWER performs Hancock's operation, comprising in the section the transparent margin of the cornea, thus opening the periphery of the anterior chamber and the anterior part of the vitreous.

Prof. PANAS remarks that statistics are required to prove the permanent effect of sclerotomy.

Dr. ARGYLL ROBERTSON stated that the trephining which he proposed five years ago was more efficient in reducing tension than iridectomy, but also more dangerous. Of late, he trephined only the sclerotic, leaving the choroid intact.

Dr. SAMELSOHN arrived, by practice, at the same conclusion as Schöler by his experiments.

Dr. KNAPP has performed sclerotomy for chronic glaucoma during the last 18 months exclusively. The results have been encouraging; better, it seems, than those of iridectomy under like conditions. No case turned into malignant glaucoma. He had no accidents, but in a case of hemorrhagic glaucoma, internal suppuration and panophthalmitis followed a correct operation. The other eye, affected with chronic glaucoma without hemorrhages, was operated on in the same way and at the same time, and made the kindest recovery. Dr. K. thinks that in the former the operation was followed by intra-ocular hemorrhage, which exceptionally occurs also after extraction, and always destroys the eye-ball.

Dr. GALEZOWSKI makes two paracenteses in the sclero-corneal junction.

Dr. WALKER, of Liverpool, has successfully treated three cases with eserine.

Dr H. PAGENSTECHER, of Wiesbaden, describes a **new operation for ptosis.** He introduces one or several sutures through the tissues of the lid from the ciliary border to the brow, leaving them until suppuration has ensued. The subsequent scar is thought to "act as a tendon to the frontal muscle in raising the upper lid, without preventing its closure."

Dr. SAMELSOHN, in ptosis operations, removes only a small part of the orbicular muscle, but stitches the lower lip of the wound to the upper part of the tarso-orbital fascia.

Dr. PARINAUD speaks in favor of **treating detachment of the retina by galvano-cautery of the sclerotic.**

Dr. DE WECKER confirms the innocence of this mode of treatment. He has pierced the sclerotic and retina with a glowing platinum wire. He never saw any reaction, but is not prepared to announce any decided cures from this procedure.

Dr. GEO. T. STEVENS, of New York, read a paper on **oculo-neural reflex irritation,** and arrives at the following conclusions:

"1. That among the centripetal influences which generate nervous affections, the irritation arising from a perplexity or exhaustion of nerves in performing the functions of adjustment of the eyes must be regarded as of great importance.

"2. That when a family tendency to neurotic affections is found, the inherited tendency is often transmitted in the form of the eyes or the condition of their accessories.

"3. That inveterate cases of functional nervous diseases not amenable to other forms of treatment, will often yield readily to the simple process of relieving the eyes from muscular or refractive disabilities."

Dr. STEVENS' ingeniously devised self-registering perimeter, which Dr. S. M. Burnett described in his report on the last meeting of the American Medical Association (these ARCHIVES, x, p. 231), was on exhibition and examined with great satisfaction by many gentlemen.

Dr. VAN DUYSE, of Ghent, Belgium, described a case of congenital orbital cyst, with microphthalmus and coloboma of the iris. He thinks that the cyst, which was situated on the floor of the orbit, prevented the development of the globe. He analyses the published cases of this anomaly.

Dr. DUFOUR, of Geneva, has **transplanted the mucous membrane of the mouth to the eyelid.** He passes the sutures through the piece of mucous membrane before he detaches it, in order to prevent its wrinkling, and to lose no time in preparing it for its new position. The immediate transportation is an evident advantage over the methods hitherto in use.

ABSTRACT OF AMERICAN OPHTHALMOLOGICAL LITERATURE DURING THE SECOND QUARTER OF THE YEAR 1881.

By Dr. SWAN M. BURNETT, Washington.

1. Chas. J. Kipp. On **eye affections from malarial poisoning.** *Trans. Med. Soc. of N. J.*, 1881.

Of that form of eye trouble accompanying the paroxysms of malarial fever, Dr. K. has no personal experience. But of those following malarial troubles he has seen a number. They were largely corneal affections. The characters of this trouble seem to be quite specific, and we add a description of them in the doctor's own clear language.

"If the eye is examined shortly after the first symptoms of irritation are noticed by the patient, one or two or more slightly raised, irregular, opaque lines of varying length will be found on different parts of the surface of the cornea. At the same time some circumcorneal injection will be present. On the following day these opaque lines will have increased in length, whilst at the same time the middle portion of the opacity has been transformed into a shallow ulcer. Under favorable circumstances no further increase in size takes place, the remaining opaque epithelium is thrown off, and reparation begins to be completed only after several weeks. But not unfrequently the ulcer continues for days, and even weeks, to grow slowly in length, and at the same time sends out club-shaped, slightly-raised, grayish offshoots from its sides. In some of my cases the ulcer crept across the entire cornea, and in a few others in which several ulcers appeared simultaneously on different parts of the cornea, nearly the whole epithelial layer was eventually destroyed. As a rule the ulcer shows no marked tendency to increase in depth, and its floor and edges are usually of bluish-gray tint, although in the very painful cases one or more small densely opaque points can be found at some part of the ulcer. The middle and inner layers of the cornea generally remain transparent throughout, but in neglected or maltreated cases an extensive star-shaped opacity of a slightly yellowish-gray tint is sometimes developed in the inner layers of the central part of the cornea. A hypopyon is but rarely seen even in the severest cases, and spontaneous perforation of the cornea did not occur in any of my cases. More or less hyperæmia of the iris is not unfrequently present. Circumcorneal injection was only rarely absent, but in no case was there much swelling of the conjunctiva.

A decrease of the tension of the eyeball, or a diminution of the sensibility of the cornea, could not be demonstrated in any of the cases. The development and growth of the ulcer was always accompanied by very severe pain in and around the eye, more especially along the course of the supra-orbital nerve, and by photophobia and lachrymation. The process of repair was commonly initiated by the extension of blood-vessels from the limbus conjunctivæ toward the ulcer, and was in all cases extremely slow, two to four months being generally required for its completion."

The reviewer can corroborate this clinical history from several cases which have fallen under his observation. The treatment consists in the administration of antiperiodics and the local use of atropine and the pressure bandage.

2. WM. DICKINSON. **Hemiopia:** Mechanism of **its causation on the theory of total decussation** of the optic tracts at the chiasma (optic commissure). *Alienist and Neurologist*, April.

Dr. D., in concluding his paper, formulates his views as follows: "1. Disorders involving the optic tract of *one* side will produce total blindness in the eye of the opposite side, and not bilateral hemiopia. 2. Diseases affecting either lateral angle of the chiasma, involving both optic-nerve fibres entering and also those leaving it, will produce bilateral hemiopia and not nasal hemiopia in one eye. 3. Diseases affecting the posterior angle of the median line, involving the optic-nerve fibres of both tracts that enter the chiasm, will affect the outer half of each retina and produce nasal hemiopia, a form utterly inexplicable on the theory of semidecussation; and, finally, 4. Diseases in front of the commissure will affect the inner halves of each retina and produce temporal hemiopia, a condition alike explicable by either theory."

3. D. WEBSTER. Two cases of **bony formation in the eye,** occurring in the practice of Dr. C. R. Agnew. *Med. Gazette*, April 2.

In one case an exudation in the ciliary region, and in the other the choroid was ossified. The lens in one case was also calcified.

4. LITTON FORBES. The **doctrine of enucleation.** *Rocky Mountain Med. Rev.*, April-May.

Simply a résumé of what is generally known and accepted in regard to the question of enucleation of the eyeball.

5. M. LANDESBERG. **Epithelioma of the eyelids.** *Med. Bull.*, May.

Three cases of epithelioma of the lids are related, which were treated by the local application of the chlorate of potassium in powder. In all perfect healing was the result.

6. J. J. CHISOLM. **Round-celled sarcoma** growing from **the conjunctiva** of a little girl only five years of age; a rare pathological development. *Va. Med. Monthly*, May.

The tumor was situated on the conjunctival surface of the upper lid of the left eye. It was round, and the size of a cherry. It had a pedicle by which it was attached to the mucous membrane at the fornix. Ball appeared healthy. It was removed by ligature. Microscopically it consisted of small round cells, with a tendency toward spindle cells in some areas. Soon after removal of the tumor the cornea became affected and sloughed, and a new growth sprang from the site of the pedicle of the first tumor, and at the date of report was about

the size of the first one when it was removed. C. has seen nothing similar in 30,000 eye cases in his own practice, nor in the practice of others.

7. H. AUGUSTUS WILSON. A brief consideration of 20 cases of **foreign bodies in the eyes.** *The Canada Lancet*, May 1.

A general consideration of the subject, with some illustrative cases.

8. A. D. ROCKWELL. A case of **exophthalmic goitre**; recovery under **electrical treatment.** *N. Y. Med. Jour.*, June.

R. has treated ten cases in all, in six of which he reports recovery, the last one of which he gives in detail. All were benefited to a greater or less degree. He does not rely upon any one method of application. When used locally, he places "the cathode over the cilio-spinal centre above the seventh cervical vertebra, and the anode in the auriculo-maxillary fossa, gradually drawing the latter (after a few moments of stabile treatment) along the inner border of the sterno-cleido-mastoideus muscle to its lower extremity. The second step in this process consists in removing the anode to the position occupied by the cathode, and placing the latter over the solar plexus, using for a few moments longer a greatly increased strength of current. In other cases, currents alternately increased and diminished may prove effective."

The application of the faradic current is often a valuable adjunct to the treatment. It seems to do good after the constant current has accomplished all it seems capable of doing.

9. IRA A. E. LYON. Four **enucleations of the eye.** *Amer. Prac.*, June.

In one case a splinter of pine wood one and a half inches long and a quarter inch wide had remained in the orbital tissues for ten years. There was, during this time, a constant discharge and a limitation in the movements of the globe.

10. GEO. REULING. A case of **iritis syphilitica,** psoriasis syphilitica, treated with **cascara amarga.** *Therapeut. Gaz.*, June.

One case is detailed in which this remedy in 40-drop doses of the extract three times a day appeared of benefit.

11. WM. S. LITTLE. **Symptoms (reflex) in and about the eye, due to some affection of the uterus** or its appendages. *Phila. Med. Times*, June 18.

Dr. L. gives the history of three cases in which the symptoms correspond with those described by Prof. Förster under the name of "kopiopia hysterica," to whose work, however, no reference is made. The eye symptoms disappeared promptly on relief to the uterine troubles.

12. P. D. KEYSER. **Jaborandi in glaucoma.** *Phila. Med. Times*, June 18.

Dr. K. has found the internal administration of jaborandi valuable in relieving the prodromata of glaucoma. He relates two cases in point. In one of his cases there was a brown infiltration in the cornea, which disappeared when the tension was reduced under the use of jaborandi.

13. A. E. PRINCE. Contribution to the **correction of strabismus** by the **advancement of the rectus.** *St. Louis M. & S. Jnl.*, June.

P. has a modification of advancement of the rectus, which he describes as follows:

"The patient being asleep, and speculum introduced, a fold of conjunctiva over the insertion of the tendon of the muscle to be advanced is grasped with the fixation forceps and elevated. A needle, armed with a salicylized silk suture, is passed through the elevated conjunctiva, parallel to and about two or three *mm.* from the corneal margin, after which the needles are cut off, making two loop sutures.

"A small opening through conjunctiva and Tenon's capsule, below and opposite the insertion of the tendon to be advanced, is then made in the usual manner, to admit of the introduction of one branch of Wecker's double hook, or appropriate forceps, which is passed underneath the tendon and drawn tense when the remaining branch is lowered upon the conjunctiva, including tendon and cellular tissue.

"This done, the tendon, with conjunctiva, is separated from the ball at its insertion by the introduction of one blade of the scissors through the opening previously made.

"Lifting the detached tendon from the ball by means of the forceps, the needles carrying the *double-loop suture* are introduced from within outward through muscle and conjunctiva, the position of the points of puncture depending on the effect desired. This step is facilitated by arranging the needle-holder to carry both needles at once, which is important when no anæsthetic is employed, for the requisite time is thereby reduced to about two minutes.

"Upon the introduction of the sutures, the forceps is to be liberated by separating the contused tendon and conjunctiva with scissors.

"A subconjunctival division of the opposite tendon having been made at the commencement when necessary, the advancement is accomplished by isolating and twisting the two sutures which form secure loops respectively through conjunctiva and muscle. The parts being cleared of blood, a knot is formed, and drawn until the tendon is deemed sufficiently advanced, when it is secured by a simple bow. The conjunctival gap will have simultaneously been closed. After recovery from the anæsthetic, and upon the return of the muscular tonicity, an examination is made to ascertain the success of the operation."

The effect is graded by the degree of tightening of the sutures. Five cases are given, and a photographic representation of one case before and after the operation.

14. E. S. PECK. **Inoculation of both eyes** for complete pannus, with gonorrhœal pus. *N. Y. Med. Record*, July 2.

Patient 21 years of age. Just able to make his way around the yard, on account of trachomatous pannus. Inoculated with gonorrhœal pus (the seventh day of the discharge) on December 14th. On the 10th of April following, V. in R. = fingers at 9 feet; in L., at $1\frac{1}{3}$ feet.

15. CHARLES A. OLIVER. The **comparative action** of **homatropine** and of **sulphate of atropia** on the iris and ciliary muscle. *Amer. Jnl. Med. Sci.*, July.

The series of experiments were conducted on ten young emmetropic eyes, and the results are as follows:

"1. A single instillation of $\frac{1}{40}$ or $\frac{1}{30}$ of a grain of hydrobromate of homatropine is insufficient to paralyze A., and hence is of no value in properly estimating refractive error.

"2. Complete paralysis of the ciliary muscle can be obtained by a single instillation of either $\frac{1}{40}$ or $\frac{1}{30}$ of a grain of sulphate of atropia.

"3. A single instillation of $\frac{1}{30}$ grain of hydrobromate of homatropine is capable of producing full dilatation of the pupil, whilst it is impossible to produce a maximum dilatation by a single instillation of $\frac{1}{40}$ of a grain of the same drug.

"4. Maximum dilatation of the pupil is produced by a single instillation of either $\frac{1}{40}$ or $\frac{1}{30}$ of a grain of sulphate of atropia.

"5. The utmost action of a single instillation of $\frac{1}{40}$ of a grain of hydrobromate of homatropine upon the ciliary muscle is attained later and lost sooner than the full paralysis occasioned by a single instillation of an equivalent amount of sulphate of atropia.

"6. The utmost action of a single instillation of $\frac{1}{30}$ of a grain of hydrobromate of homatropine upon the ciliary muscle is attained sooner and more quickly lost than the full paralysis occasioned by a single instillation of an equivalent amount of sulphate of atropia.

"7. The mydriasis of a single instillation of $\frac{1}{40}$ or $\frac{1}{30}$ grain of hydrobromate of homatropine is not so quickly produced, and is of shorter duration than that of a single instillation of $\frac{1}{40}$ or $\frac{1}{30}$ grain of atropia.

"8. *Complete* paralysis can be obtained by a single instillation of $\frac{1}{30}$ grain of hydrobromate of homatropine at the time of the utmost action of a single instillation of $\frac{1}{30}$ grain of hydrobromate of homatropine, thus allowing ametropia to be accurately determined.

"9. A single instillation of either $\frac{1}{16}$ or $\frac{1}{30}$ grain of hydrobromate of homatropine, by reason of its transient effect on the iris and ciliary muscles, is valuable when we desire accurate ophthalmoscopic examinations in cases dependent on their use.

"10. The conjunctival irritation may be avoided by the use of an absolutely neutral salt.

"11. Single instillations of the amounts given are perfectly free from injurious constitutional effect."

16. E. G. West. **Epithelioma** of the **conjunctiva** bulbi. *Bost. Med. and Surg. Jour.*, July 7.

The patient was a man 76 years old. "In 1879 first noticed the white nodules at angles of left eye. By the summer of 1880 they had increased in size, and others were added, and blood-vessels radiated from them. For two months preceding the 17th of September the growth was very rapid, becoming two thirds the size of the cornea, and encroaching on the latter one fifteenth of an inch. The discharge from the eye was creamy and considerable, but there was no pain. In consultation with Dr. Williams, it was decided to try to snip it off, inasmuch as most if not all these growths originate in the conjunctiva. During the operation the growth was found to be very brittle, but it was thoroughly removed and examined, and found to be an epithelioma. The wound did not heal well, and by four weeks after the operation the whole base was covered with little nodules. Eight weeks after the operation the mass had

become even larger than it was before, and two deep pockets had formed where the growth had extended under the conjunctiva, which would fill up with excretions and then discharge. After seeing Dr. Williams again, Dr. Wadsworth was seen, and advised a total enucleation, for the conjunctiva had been all removed in the first operation, and therefore the growth must now be on the sclera, and so it could not be thoroughly removed without opening the cavity of the eye. That this opinion was correct, was afterward shown by microscopic examination. Removal of the outer half of the eye was rejected since there was no certainty how far the growth had gone, and the wearing of a glass eye might cause it to reappear. It was removed on December 4th, and since that time (four months) there has been no return, and he now has only a slight discharge from the eye."

No account is given of the histological character of the tumor.

17. JAMES L. MINOR. **Anæsthesia of the cornea,** and its significance in certain forms of eye disease. *Amer. Jour. Med. Sci.*, July.

Dr. M. gives the notes of ten cases, in which anæsthesia of the cornea was the prominent symptom. There was, at the same time, a conjunctivitis, due to vascular paralysis, and in the majority of instances a keratitis, which sometimes went on to ulceration. The pupil was generally contracted, but iritis was not observed, though the pupil was but little influenced by atropine. Globe tension was usually reduced. The seat of the lesion is considered to be in the Gasserian ganglion. In some cases there is reason to suppose a malarial origin, since quinine has been found of benefit. In cases complicated with neuralgia, and even in some that are not, gelseminum seems to be useful in five-drop doses every two or three hours, combined with small doses of morphia.

18. S. D. RISLEY. **Weak eyes** in the **public schools** of Philadelphia. *Phila. Med. Times*, July 30th.

Dr. R. was the chairman of a committee appointed by the Philadelphia County Medical Society to examine the eyes of the children in the public schools of Philadelphia.

The number of pupils examined was 2,422. The results we give in his own words, as follows:

"Among the questions of greatest interest which at the outset of this investigation presented themselves were:—

"*First. Would our more youthful civilization yield different results, regarding the percentage of increase in myopia, from those reached by European observers?* This was important, as tending to shed light upon the possible heredity of myopia. This latter could be fully answered only by a careful study of the family history of a large number of myopes. My statistics, and the records of private practice, have placed this within reach, but time has not permitted its development. The question as stated has received a decisive answer.

"*Second.* Myopia having been found to increase during school life, *did the increase come from the emmetropic eyes while they were recruited* pari passu *from the hypermetropic?* i. e., *did the eyes with hypermetropic refraction pass through emmetropia to swell the percentage of myopia?* This involved the question as to which is to be considered the model eyeball.

"*Third. What relation, if any, existed between our educational process and*

the increasing percentage of near-sight, and to what extent were imperfections in our school-system responsible for the increase?

"These questions, and many of secondary importance involved in them, have received answers in the preceding discussion, which are again summarized in the following conclusions, and are, we believe, fully justified by the preceding facts.

"*First.* That the emmetropic eye is the model or standard eye,—since emmetropia was shown not only to remain nearly constant in percentage throughout the school life, but that it was also the condition of health, and withal enjoyed the highest acuity of vision and the greatest freedom from pain.

"*Second.* That myopia, or near-sight, commencing in the primary classes with a low percentage (4.27 per cent.), steadily increases as the pupils pass to the highest grade in our public-school system; that the percentage of increase is very much lower in the schools of Philadelphia than in the schools of Europe; that the myopic eye presents a higher percentage of disease than eyes with emmetropic or hypermetropic refraction; that even in *myopic* eyes the percentage of disease is much higher when astigmatism is also present.

"*Third.* That hypermetropic eyes are more numerous than both myopic and emmetropic combined; that, next to myopic astigmatism, distinct lesions are most prevalent in eyes with hypermetropic astigmatism; that the increase in myopia is from eyes with already existing anomalies of refraction,—usually hypermetropic astigmatism,—since it was shown that in hypermetropic, next to myopic astigmatism, was exhibited the highest percentage of disease, which also manifested itself in pathological changes similar to, or identical with, those usually regarded as characteristic of myopia.

"This conclusion is strengthened by the fact that such change has taken place under direct observation. It is by no means necessary that the distending eyeball should first pass through emmetropia. In several instances I have had the opportunity of witnessing the gradual change from hypermetropic astigmatism to myopic astigmatism, the meridian of greatest curvature being maintained. Four of these cases were published in the *American Journal of the Medical Sciences*, October, 1880. In one of these published cases a high degree of simple hypermetropic astigmatism passed through mixed to simple myopic astigmatism. Since the date of publication, the left eye has continued to distend, until at the present writing it presents compound myopic astigmatism.

"*Fourth.* That, while there is an evident and close relation between the increase of myopia and the school life, nevertheless, having the preceding conclusions in view, *the educational methods are responsible to only a limited degree.*

"This conclusion is supported by the fact so strongly demonstrated in this report, namely, the very obvious relation between the errors of refraction and the diseased conditions of the *fundus oculi*, which shows beyond dispute that the fault is not, primarily, in the system of education, however faulty this may be in many respects, but depends upon the defects which existed in the eye itself at the beginning of the school life. The conclusion, therefore, may be formulated as follows:

"That, *given an emmetropic or normal eye, the probabilities are that no harm will come to it from the educational process.* On the other hand, *given an eye with an anomaly of refraction, especially astigmatism, the probabilities are, other*

things being equal, that the educational process will be fraught with pain and danger to the eye.

"Therefore, that before entering school the possible existence of defective vision should be excluded.

"*Fifth.* That the probability of harm resulting from the school life diminishes with every added year of age, in all states of refraction.

"This conclusion finds strong support in the condition of even the emmetropic eyes in the primary schools, as compared with those in the higher classes, as is graphically set forth in Table VI.

"Therefore, that our children are placed at school at a too tender age.

"*Sixth.* That, in view of the facts herein set forth, the great importance of proper hygienic surroundings and a wisely chosen and arranged curriculum of study is more than ever manifest.

"In arranging the course of study, the principle to be kept in mind is the avoidance of protracted use of the eyes at a near point,—*e. g.*, in reading, writing, or drawing."

19 W. C. AYRES. **The Development of the Eye.** *N. Y. Med. Jnl.*, July.

In this number of the *N. Y. Med. Jnl.*, Dr. A. begins a series of articles on the embryology of the eye. We cannot, in a short abstract, do justice to this excellent paper, and we trust when the series is completed it may be given to us in a more permanent and accessible form. The present article deals principally with the development of the lens. He thinks, with the majority of authors, that the lens is round and hollow when first formed. He criticises the drawings made by Arnold and Evetsky of the mass which fills this cavity.

20. DAVID WEBSTER. A somewhat remarkable case of **glaucoma. Aphasia.** Death from probable **apoplexy.** *Archives of Med.*, Aug.

The connection between the brain trouble (softening) and the glaucoma is not clearly made out. Syphilis was present, and may have been the cause of both. The important part of the clinical history is the fact that prodromata of glaucoma existed in the right eye for years without any considerable impairment of vision or limitation of V. F. The left was lost through glaucoma absolutum, before the patient was seen by Dr. Agnew, from whose practice the case is reported.

REPORT ON THE PROGRESS OF OPHTHALMOLOGY FOR THE SECOND HALF OF THE YEAR 1880.

By Dr. H. MAGNUS, of Breslau, and Dr. A. NIEDEN, of Bochum.

Translated by Dr. R. O. Born, of New York.

PATHOLOGICAL ANATOMY AND SPECIAL PATHOLOGY.

By A. NIEDEN.

IV.—PATHOLOGICAL ANATOMY.

247. Adamück. The **decussation** of the optic-nerve fibres **in the chiasm** in man. *A. f. O.*, vol. xxvi, 2, p. 187. Two cases of atrophy of the globe of long standing; in one the atrophic nerve had a diameter of $1\frac{1}{2}$ *mm.*, the corresponding tract $3\frac{1}{2}$ *mm.*; the other tract measured 4 *mm.*, the healthy nerve $5\frac{1}{2}$ *mm.* In the second case the atrophic optic nerve had a diameter of 2 *mm.*, the healthy nerve 6 *mm.*, the tract opposite to the atrophic nerve 4 *mm.*, the other tract $4\frac{1}{2}$ *mm.*

248. Barabascheff (from the clinic of Prof. Hirschmann, of Charkow). Intra- and extra-ocular endothelioma. These Arch., vol. ix, 4, p. 420.

249. Brailey and Walter Edmunds. The conditions of the **optic nerve, ciliary body,** and **iris in increased tension.** *Ophth. Hosp. Rep.*, vol. x, 1, p. 86. The vessels of the optic nerve show proliferation of the endothelium (sclerosis of the blood-vessels). The inner nerve-sheath is thickened, the total diameter is diminished; sclerosis especially in hemorrhagic glaucoma. Neuritis occurs often and at an early period in corneal ulcers and after injuries, and precedes the increase of tension. In primary glaucoma the muscular fibres of the ciliary body are atrophic, the ciliary processes are fibrous, the iris is atrophic, especially at the periphery. In consequence of the atrophy of the ciliary body, the iris is almost in contact with the cornea. In serous inflammation of the uveal tract and subsequent glaucoma, neither the ciliary muscle nor the iris are atrophic. Sclerosis never occurs without atrophy.

250. BRAILEY. Curator's report. **Morbid anatomy of glaucoma.** *Ophth. Hosp. Rep.*, vol. x, pp. 94 and 131.

1. Twenty-nine cases of primary glaucoma without retinal hemorrhage.
2. Twenty-one cases of primary glaucoma with retinal hemorrhage.
3. Eight cases of glaucoma after injuries with comparatively little inflammation.
4. Twenty-two cases of glaucoma after perforating ulcer of the cornea.
5. Five cases of glaucoma with staphylomatous protrusion of the anterior segment of the globe.
6. Three cases of glaucoma following serous iritis.

251. BRÜCKNER. Double disseminate tuberculosis of the choroid with papillo-retinitis in a child, which died from general miliary tuberculosis. *A. f. O.*, vol. xxvi, 3, pp. 154–173, with a critical review of the literature on this subject.

252. CARL (Duke of Bavaria). Contribution to the knowledge of the **bacteria** occurring in man. *C. f. A.*, vol. iv, p. 305. In a normal globe, taken from a dead body, the layer of larger blood-vessels of the choroid and the chorio-capillary layer were densely filled with bacteria; there were neither any other traces of putrefaction nor did the preserving fluid and the other bulbi contained in the same jar show any bacteria. The accumulation was in many places so great that miliary aneurisms had been produced, whilst the smaller arteries and veins contained hardly any bacillæ; it becomes thereby so much more probable that they were present in the blood and had been propelled into the chorio-capillary layer, where they had been arrested at the transition of the larger vessels into the smaller capillaries. They resembled mostly the bacillar organisms which are found in septic processes.

253. CERVERA (Madrid). The formation of fungi in the palpebral and bulbar conjunctiva (oidium albicans). *Intern. Congr. of Milan*, Sept. 4, 1880; *Progr. Méd.*

254. COSTA PRUNEDA. **Primary tuberculosis of the iris** in man, with successful inoculation on rabbits. *A. f. O.*, vol. xxvi, 3, p. 174, with two cases of genuine tuberculosis of the iris.

255. DEUTSCHMANN. **Tuberculosis of the eye by inoculation.** *A. f. O.*, vol. xxvi, 2, pp. 99–101. *Post-mortem* examination of a case mentioned in *A. f. O.*, vol. xxv, 4, in which the inoculation of tubercles into the vitreous was followed by tuberculosis of the vitreous, choroid, retina, and lungs.

256. HIRSCHBERG. Notes on **malignant tumors** of the globe: 1, glioma retinæ, 2 cases with the most recent literature on this subject; 2, choroidal sarcoma, 3 cases; 3, melano-sarcoma, resp. precorneal carcinoma, 2 cases. These ARCH., vol. x, 1, p. 55.

257. HOCQUARD. Anatomie et physiol. path. des staphylomes. *Ann. d' Ocul.*, vol. 84, p. 45.

258. MANFREDI and COFLER. De la tuberculose oculaire. *Intern. Congr. of Milan; Arch. d' Ophth.*, vol. i, p. 44.

259. MANFREDI (Modena). The **origin of capsular cataracts.** A simple contusion is sufficient to produce an exudation under the capsule, which be-

comes organized in layers. A lesion of the capsule always causes this form of cataract. In these lamellated exudations PONCET has demonstrated the presence of nucleated vacuoles. Proliferation and suppuration of the capsular epithelium can be the result of irritating injections into the anterior chamber. *Intern. Congr. of Milan; Progr. Méd.*, Sept.

260. MANZ. Anatomical examination of an eye with **retinitis proliferans**, with illustr. *A. f. O.*, vol. xxvi, pp. 55–76. It is a case, mentioned in vol. xxii, 3, p. 229, of retinitis with proliferations starting from the inner surface, especially near the central vessels. The author does not adopt LEBER'S theory that they are the result of hemorrhages.

261. NOYES. **Glioma** in **both eyes.** The *post-mortem* examination showed extraordinary softness of the cerebral substance, gliomatous degeneration of the ependyma of the ventricles, and diffuse gliomatous infiltration; no circumscribed tumors. *Amer. Ophth. Soc. at Newport*, 1880.

262. PONCET. In the plaques of fatty degeneration of **albuminuric retinitis** the optic-nerve fibres, in their course to the rods, are enveloped in sheaths, upon which are endothelial cells which make up both layers of granules. The granules are not nervous elements, but nuclei of connective-tissue cells. *Intern. Congr. of Milan; Progr. Méd.*, Sept.

263. PONCET. Contribution to the pathology of **pterygium.** In specimens which comprise the conjunctiva and cornea, the author has demonstrated an ulcer infected with bacteria. The bacteria send small spores into the submucous network of lymphatics, they gradually enter the corneal spaces in the shape of a triangle, and thus cause the slow but steady progress of the process. *Intern. Congr. of Milan; Progr. Méd.*, Sept.

264. PURTSCHER. **Decussation** and **atrophy of the nerves in the optic tract.** Anatomo-pathol. examination. *A. f. O.*, vol. xxvi, 2, pp. 190–220, *Intern. Congr. of Milan.* GUDDEN'S view is confirmed by six cases of one-sided atrophy of the optic nerve; two cases are added of atrophy of both nerves following destruction of both globes, and one case after hydrocephalus internus. He further reports a case of destruction of the left thalamus opticus by a circumscribed tubercle, with the right tract and both optic nerves entirely normal, and one case of total destruction of the posterior lobe (the visual sphere), in which no abnormity could be demonstrated in either tract.

265. SUCHANNECK. **Adenoma** from the **lid** of a dog. *Danz. Naturf. Vers., C. f. A.*, iv, 327. The tumor is congenital, and shows a number of glandular conglomerations, with a membrana propria of the individual tubules and a distinct single layer of epithelial cells.

266. TREITEL. Contributions to the pathological anatomy of the eye. *A. f. O.*, xxvi, 2, pp. 83–116. 1. Adherent corneal scar, funnel-shaped detachment of the vitreous, hemorrhages in the optic nerve. 2. Plastic iridocyclitis with total posterior synechia, total detachment of the retina, retinal cyst, large choroidal hemorrhage. 3. Detachment and cystoid degeneration of retina, peculiar bodies between the retinal folds. 4. Neuro-retinitis from cerebral tumor without hydrops of the optic-nerve sheaths. 5. Total aniridia and traumatic aphakia.

267. UHTHOFF. The pathological changes of the **retina in progressive**

pernicious anæmia. *Z. M.*, xviii, p. 513. In six eyes of four patients were: 1, hemorrhages in different layers of the retina; 2, varicose hypertrophy of the non-medullated nerve fibres and of the layer of nerve fibres; 3, shining colloid bodies and finely granular masses of varying shape and size in the intergranular layer.

268. WALTER EDMUNDS and BRAILEY. Some **changes of the blood-vessels in ocular diseases,** in their relation to general pathology: 1. In glaucoma there is hypertrophy and sclerosis of the walls of the arteries; 2, in syphilis the walls of the retinal arteries in transverse sections are fissured and thickened, the capillaries frequently varicose; 3, in the serous inflammation of the uveal tract there is especially proliferation of the nuclei of the stroma. *Ophth. Hosp. Rep.*, x, 1, p. 132.

V.—SPECIAL PATHOLOGY.

CONJUNCTIVA.

269. CERVERA. Conjunctivitis caused by fungi. *Intern. Congr. of Milan; Prog. Méd.*

270. DEMAY. Décollement de l' epithélium conjonctival et kératique par une suffusion sanguine. *Franc. Méd.*, 103.

271. DEVILLE, E. Subacute purulent ophthalmia transmitted from a urethro-vaginitis. *Presse Méd.*, xxxii, p. 27.

272. GALVANI, JULES. Syphilis of the conjunctiva. *Gaz. hebd.*, xvii, 2, 21.

273. GOSSELIN. Tumors of the conjunctiva. *Gaz. des Hôp.*, 50.

274. HAMPE. Infectious diseases of the eye. *Inaug.-Diss.*, Berlin.

275. LEBER. 1, High degree of ectasia of the anterior ciliary and conjunctival veins in both eyes without any other important changes in the eyes; 2, subconjunctival varix; 3, hemorrhagic lymphangiectasia of the conjunctiva. *A. f. O.*, xxvi, 3, p. 191.

276. NETTLESHIP. Diphtheritic ophthalmia. *St. Thomas Hosp. Rep.*, vol. x.

277. SCHENKL. Cases of atropine conjunctivitis. *Prag. Med. Wochenschr.*, vol. v, p. 19.

278. SZOKALSKI. Diphtheritic conjunctivitis. *Pam. Tow. Lekarska*, p. 409.

279. SZOKALSKI. A case of **syphilitic ulcer** of the tarsal **conjunctiva** of the lower lid in a boy; possibly infected by a syphilitic person who with his tongue tried to remove an eyelash from the conjunctival sac, a method generally in use in that country for the removal of foreign bodies. *Pam. Tow. Lekarska*, p. 917; *C. f. A.*, iv, p. 380.

280. TALKO. Intense keratitis produced by hairs which had grown through conjunctival granulations. *Intern. Congr. of Milan; Prog. Méd.*

281. WOLFE, of Glasgow. Lectures on ophthalmology. 1, Ophthalmia neonat., purulent conjunctivitis, gonorrhœal ophthalmia; 2, phlyctænular conjunctivitis, pustular conj., exanthematous affections of the conjunctiva. *Med. Times & Gaz.*, Nos. 1575 and 1577.

282. ZWINGMANN. Amyloid tumors of the conjunctiva. *Inaug.-Diss.*, Dorpat.

CORNEA AND SCLEROTIC.

283. KOUGH. Case of perforating corneal ulcer. *Med. Times & Gaz.*, No. 1589.

284. LABORDE. Changes in the eye after partial division of the trigeminus in the cranial cavity. *Bull. de l' Acad.*, vol. ix, 2. S., 18, p. 447.

285. DE LATOUR SAINT YGEST. Considér. sur l' étiologie et le traitement, des ulcères à hypopion, conséc. à certaines brûlures de la cornée. *Thèse de Paris.*

286. LEBER. Spontaneous episcleral abscess, in a normal eyeball, ending in recovery. *A. f. O.*, vol. xxvi, 3, p. 263.

287. PANAS. Corneal staphyloma. *Gaz. des Hôp.*, No. 46.

288. THADEN, C. v. Posterior scleral staphyloma. *Inaug.-Dissert.*, Kiel. Of 335 persons between 50 and 80 years of age, it was found in 99, or 29.5 per cent. (myopes excluded).

289. WHITINGTON. Double-sided **keratoconus**, developed during pregnancy. Excision. *The Lancet*, vol. i, 23, p. 878.

290. WOLFE. Lectures on ophthalmology. 4. Vascular opacities of the cornea; melanotic tumor of the cornea; sarcoma; staphyloma. *Med. Times & Gaz.*, No. 1589.

IRIS AND UVEAL TRACT.

291. ARMAIGNAC. **Aniridie congén.** presque complète. Two attacks of serous choroiditis with glaucomatous tension and almost total blindness. Luxation of the lens into the vitreous. Recovery. *Rev. d' Ocul. du Sud-Ouest*, vol. i, p. 49.

292. ARMAIGNAC. Contrib. à l' étude de la kératite ponctuée ou Descemetite, *l. c.*, p. 73.

293. BADAL. Coloboma of the coats of the eye and of the lens, amaurosis. *Gaz. des Hôp.*, No. 58.

294. BLIESKE. A case of croupous iritis. *Inaug.-Dissert.*, Greifswald.

295. BRÜCKNER. Dissemminate tubercles of the choroid with papillo-retinitis in both eyes of a child which died of general tuberculosis. *A. f. O.*, vol. xxvi, 3, p. 154.

296. CHAUVEL. Coincidence d' une cyclite aiguë et d' une névrite optique. *Prog. Méd.*, No. 32.

297. CERVERA (Madrid). A case of total irideremia in both eyes with soft cataract. *Intern. Congr. of Milan; Prog. Méd.*

298. COSTA-PRUNEDA. Two cases of primary tuberculosis of the iris. *A. f. O.*, vol. xxvi, 3, p. 174.

299. DEUTSCHMANN. **Heredity of acquired ocular affections in the rabbit.** *Z. M.*, vol. xviii, p. 507. Two cases. In one case there was a marked chorio-retinitis; in the second, coloboma of the iris and choroid in both eyes.

300. HOTZ. Irido-choroiditis rheumatica in both eyes with fibrinous exudation into the anterior chamber, the second eye affected five months later than the first. *A. O.*, vol. ix, p. 281.

301. HOTZ. Syphilitic iritis. *A. O.*, vol. ix, p. 283.

302. LAAN v. d. Gômas de corp. cil. *Period. d' Offalm. Prat.*, Nos. 3, 4, p. 33.

303. LEBER. Two cases of **metastatic choroiditis**, caused by a purulent inflammation of a finger, with preservation of life, but with loss of one eye in one case, loss of both eyes in the other. *A. f. O.*, vol. xxvi, 3, p. 201.

304. MAYNHAUSEN. Staphyloma posticum with unusually strong pigmentation. *Z. M.*, vol. xviii, p. 524.

305. ROSEMONT-MALBOT. Étude sur le tremblement de l' iris et sa pathogénie. *Thèse de Paris.*

306. SAMELSON. The ciliary processes in irideremia (and aphakia). *C. f. A.*, vol. iv, p. 213.

307. SAMELSON. An unusual case of persisting **pupillary membrane**, with adherent leucoma in both eyes, and with anterior resp. posterior polar cataract. *C. f. A.*, vol. iv, p. 215.

308. SCHMIDT-RIMPLER. **Choroidal colobomata** and **their relation to myopia.** *A. f. O.*, vol. xxvi, 2, pp. 221–235. The author does not assume in all cases an arrest of development, an insufficient closure of the coats, but a preceding choroiditis. Especially the coloboma at the macula can be in no relation to the fœtal ocular cleft and its closure.

309. SCHÖLER. A case of considerable accumulation of **cholesterine** crystals **in** the **anterior chamber.** *Berl. Klin. Wochenschr.*, No. 29.

310. SCHROEDER, TH. v. Contribution to the knowledge of syphilitic iritis. *Inaug.-Dissert.*, Dorpat.

311. SEGGEL. Irido-choroiditis gummosa and the frequency of syphilitic iritis in general. *A. O.*, vol. ix, p. 403.

312. WILLIAMS. Two cases of serous cysts of the iris produced by scars of the iris. *Amer. Ophth. Soc.*, *A. O.*, vol. ix, p. 32.

313. WOLFE. Lectures on ophthalmology. 5. Injuries and diseases of the iris. *Med. Times & Gaz.*, No. 1591.

SYMPATHETIC OPHTHALMIA.

314. BUNGE (GRAEFE'S clinic). Clinical observations on sympathetic ophthalmia. Dessau, Weniger & Co. He opposes KNIES' theory of transmission along the optic-nerve sheaths, warmly recommends enucleation, even after plastic iritis has begun, and strongly warns against optico-ciliary neurotomy. Numerous cases.

315. CAMUSET. Cataract of sympathetic origin. *Gaz. des Hôp.*, No. 61.

316. LÖBERG. A case of sympathetic ophthalmia. *Norsk. Mag.*, vol. x, 4, p. 303.

317. WEBSTER. Eleven cases of **sympath. ophthalmia after cataract operations.** *Amer. Ophth. Soc.*, *A. O.*, vol. ix, p. 336.

GLAUCOMA.

318. BRAILEY. **A theory of glaucoma.** Increase of tension can be caused by increased influx or diminished efflux. The former can be the result

of increased supply of blood and inflammation of the ciliary body and iris; the latter is caused by changes in the region of the ligamentum pectinatum. *Ophth. Hosp. Rep.*, vol. x, 1, p. 10.

319. GREEN (St. Louis). Glaucoma in hemorrhagic retinitis after the instillation of one drop of duboisine. Cured by pilocarpine. *Amer. Opth. Soc.; A. O.*, vol. ix, p. 342.

320. KUBLI. A case of absolute amaurosis lasting two months, from glaucoma simplex, with restoration of sight. *Z. M.*, vol. xviii, p. 421.

321. LAQUEUR. The **prodromal stage of glaucoma**. A clinical study. It shows itself as temporary obscurations and perception of colored rings with palpable increase of tension. At times there is a light diffuse opacity of the cornea. The attack disappears spontaneously or after sleep, or passes off after the instillation of eserine. *A. f. O.*, vol, xxvi, 2, pp. 1–28.

322. PRIESTLEY SMITH. The **pathology of primary glaucoma.** The fundamental cause is a diminution of the space between the ciliary processes and the lens. Whenever this abnormity is present, venous or arterial hyperæmia or increased secretion in the eye can be the immediate cause. The increase of the diameter of the lens with age and swelling of the ciliary processes also tend to narrow that space. In chronic glaucoma the former is the predominating cause, vascular hyperæmia in acute glaucoma. *Brit. Med. Journ.*, Sept.

323. SCHENKL. The **heredity of glaucoma.** A mother and three children were affected with acute glaucoma almost at the same age. *Prag. Med. Wochenschr.*, vol. v, 42, p. 413.

RETINA AND FUNCTIONAL DISTURBANCES.

324. ANGELUCCI. La trombosi della vena centrale della retina. *Ann. d' Ott.*, ix, p. 187.

325. BAROLT. Contribution à l' étude du scotome scintillant ou amaurose partielle temporaire. *Franc. Méd.*, No. 75.

326. BELLONARD. De hémianopie, précédée d' une étude sur l' origine et l' entrecrosiement des nerfs optiques. *Thèse de Paris.*

327. BARRY. On central amblyopia. It is not caused by nicotine-poisoning. *Ophth. Hosp. Rep.*, vol. x, 1.

328. FUCKEL. Hemianopsia ending in recovery. *Deutsch. Arch. f. Kl. Med.*, vol. xxvi, 3 and 4.

329. GEISLER. Cases of amblyopia and amaurosis. *Schmidt's Jahrb. f. Med.*, 186, p. 275.

330. HEYL. Retinal lipæmia. There was beginning cataract, enlarged blood-vessels, and a peculiar white color in the fundus. *Amer. Ophth. Soc.; A. O.*, vol. ix, p. 339.

331. HORSTMANN. Optic neuritis. *Deutsche Med. Wochenschr.*, Nos. 31 and 32.

332. HUTCHINSON, J. **Retinal hemorrhages** in young individuals suffering **from epistaxis and constipation.** The patients mostly belonged to

rheumatic families. The temporal arteries were large and tortuous. *C. f. A.*, vol. iv, p. 364.

333. JAVAL. Sur l' amblyopie des strabiques. *Acad. de Méd.*, 7 Dec. ; *Gaz. Méd. de Paris*, No. 50 ; *Progr. Méd.*, No. 50.

334. KAHLER. Septic affections of the retina. *Prag. Med. Zeitschr. f. Heilk.*, vols. i, 2, pp. 111-132.

335. KNAPP. Two cases of **diabetic retinitis.** In one case neuro-retinitis, in the other sudden blindness in *one* eye, the fundus milky white, at the macula a cherry-red spot. Later total atrophy of the retina and optic disc, followed by hemorrhagic irido-choroiditis and glaucoma. Enucleation. The other eye normal. *Amer. Ophth. Soc. ; A. O.*, vol ix, p. 340.

336. KNAPP. A case of one-sided blindness by **ischæmia retinæ** from exhaustion and anæmia. Recovery. *Amer. Ophth. Soc. ; A. O.*, vol. ix, p. 341.

337. LANG (HIRSCHBERG'S clinic). 1, a case of one-sided hemianopsia ; 2, a case of crossed temporal hemianopsia. Diagnosis : circumscribed affection at the angle of the chiasm (anterior or posterior). *C. f. A.*, vol. iv, pp. 217-220.

338. LEBER. **Reflex-amblyopia** of **traumatic** origin, caused by an irritation of the supra-orbital nerve ; rapid cure by subcutaneous injections of morphine. *A. f. O.*, vol. xxvi, 2, p. 249.

339. LEBER. **Transitory blindness** after long-continned **spasm** of the lids **in phlyctænular keratitis** of small children. He thinks that, under certain conditions, the sight which had been acquired, can be lost, and must gradually be practised again. *A. f. O.*, vol. xxvi, p. 261.

340. LORING (Washington). A case of aneurysmal dilatation of a branch of the central retinal artery. About 1 od. diam. distant from od. *Amer. Ophth. Soc. ; A. O.*, vol. ix, p. 339.

341. REICH. Neurosis of the visual apparatus caused by continual influence of dazzling light. *A. f. O.*, vol. xxvi, p. 135. Observed in men working in the snow of the Gudaur Pass in the Caucasus.

342. RUSSI. The **constrictions of the optic nerve** and their influence upon the eye. The cornea becomes insensible, not permanently, however, in all its parts, and remains transparent. The pupil becomes ad maximum contracted ; after 10-12 hours returning to the normal size. The iris reacts again to light, whilst the cornea still remains insensible. Increase of tension is not observed. The optic disc shows anæmia, choking, papillitis, and atrophy. *Inaug.-Diss.*, Berne.

343. SANTOS FERNANDEZ. Congenital amaurosis (?). Spontaneous cure with the appearance of menstruation. *Gaz. Somb.*, vol. ii, p. 224.

344. SCHIESS-GEMUSEUS. Double neuro-retinitis with extensive retinal hemorrhages. Autopsy. *Z. M.*, vol. xviii, p. 380. In the left posterior lobe of the cerebrum was found a pretty large, indurated area of yellowish and in some parts of black color, evidently an old apoplexy ; in both optic thalami older and more recent hemorrhages, the pons softened, studded with hemorrhages which extended in stripes into the crura pontis ad cereb. et cerebellum.

345. STANFORD, MORTON. **Pulsation in embolism** of the central ret-

inal artery, probably caused by an embolus which occluded the lumen only partially. In one case the pulsation lasted only a short time; after the lapse of 10 days the vessels were well filled. *Ophth. Hosp. Rep.*, vol. x, 1.

346. STONE. Case of hysterical hemi-amaurosis. *Med. Times and Gaz.*, p. 241.

347. VLADESCO. Causes of amblyopia in Bulgaria. It is especially caused by marsh-miasms. The changes are hemorrhages, pigmentation of the leucocytes, œdema, etc. Of 164 cases, there were 85 of malaria, 58 of anæmia, 21 of alcohol- and tobacco-poisoning. *Intern. Congr. of Milan; Progr. Méd.*, Sept.

348. VOSSIUS (v. HIPPEL's clinic). A case of one-sided retinitis, probably from erysipelas. *Z. M.*, vol. xviii, p. 410.

349. WADSWORTH. Neuritis after measles. 3 cases. 1, atrophy of od., blindness; 2, neuro-retinitis, S=0, death; 3, papillitis, recovery. Paralysis of the abducens. *Amer. Ophth. Soc.; A. O.*, vol. ix, p. 341.

350. WATSON, SPENCER. Neuritis of the optic nerve with subsequent atrophy. Cyst in the maxillary antrum. *Brit. Med. Journ.*, p. 849.

351. WEBSTER. Amblyopia from the abuse of alcohol and tobacco. *N. Y. Med. Rec.*, vol. xviii, pp. 649, 665, 668.

OPTIC NERVE.

352. AGNEW. Glioma of the retina and optic nerve. Enucleation of both eyes 6 years previously, the optic nerves infiltrated with glioma-cells. The patient is still living. *Amer. Ophth. Soc.; A. O.*, vol. ix, p. 340.

353. RAMPOLDI. Gliosarcoma of the optic nerve without affection of the eyeball. *Intern. Congr. of Milan; Progr. Méd.*

354. SANTOS FERNANDEZ. Congenital amblyopia from a rudimentary condition of both optic discs. From the history it remains doubtful whether there has not been some retino-choroidal disease. *Crón. Médic. Quirúrgica*, Barcelona; *C. f. A.*, vol. iv, p. 381.

VITREOUS BODY.

355. ADAMS. Opacities in the vitreous humor following injury. *The Lancet*, No. 25.

356. CARRERAS ARÀGO. A rare case of **persistent hyaloid artery.** The string was white, was detached at the anterior end, and was floating in the vitreous. Circumscribed posterior cortical cataract of the left eye. *Intern. Congr. of Milan; Progr. Méd.*

357. HIRSCHBERG-KRAUSE. A case of formation of **praeretinal blood-vessels** in the vitreous, in a patient 23 years of age, who suffered from multiple circumscribed chorio-retinitis. *C. f. A.*, vol. v, p. 48.

LENS.

358. BRACCHINI, ETTORE. Sopra un caso di lussazione delle lenti crystalline nella camera anteriore, opacamento delle medesime e midriasi permanenta. Operazione di cateratta e guarizione. *Ann. di Ott.*, vol, ix, p. 72.

359. CARTER. Soft cataract in one eye and a high degree of myopia in the other, both recent dislocation of the lens in the vitreous. *The Lancet*, No. 20.

360. FANO. Lussazione sotto-congiuntivale delle cristallino. *Ann. di Ott.*, vol. ix, p. 364.

361. MANFREDI. The formation of capsular cataract. *Intern. Congr. of Milan.*

362. PLACIDO. Una nova anomalia de conformacione do cristallino. *Period. d' Offtalm. prat.*, p. 41.

363. RAMPOLDI. Cataratta centrale stazionaria, ampliamento semplice della pupilla. *Ann. di Ott.*, vol. ix, p. 157.

364. TALKO. On luxations of the lens. *A. f. Aug.*, vol. ix, p. 470. (See D'Oench, *A. O.*, vol. x, p. 89.)

ACCOMMODATION AND REFRACTION.

365. ABADIE. Tenotomie partielle des muscles de l' œil et myopie progressive. *Ann. d' Ocul.*, vol. 83, 7–8.

366. COHN. **Writing, print, and spread of short-sightedness.** *C. f. A.*, vol. iv, pp. 224 and 361. The size of the letters must be at least 1.5 *mm.*, the thickness of their chief strokes 0.25 *mm.*, the interval between the lines 2.5 *mm.*, and the length of the lines should not exceed 100 *mm.* Roman is preferable to italic. Out of 9,096 pupils of the college the percentage of myopes from the sixth to the first class was 22, 27, 33, 46, 52, 53 per cent.

367. DENNET. Report of examination of the eyes of the pupils in the schools at Hyde Park. Boston, 1880.

368. DERBY, HASKET. The prevention of short-sightedness in young people. *Bost. Med. and Surg. Journ.*, vol. cii, 28, p. 533.

369. HORSTMANN. The **refraction of the new-born.** In 40 eyes under the influence of atropine, there were 28 hyperopic, 8 emmetropic, 4 myopic (twice = 1 D., twice = 0.5 D.), whilst JAEGER found 17 per cent. of H., 5 per cent of E., and 78 per cent. of M. *C. f. A.*, vol. iv, p. 327.

370. JAVAL. De la myopie progressive. *Ann. d' Ocul.*, vol. 83, 7–8.

371. JAVAL. La myopie progressive dans ses rapports avec la longueur des lignes d' impression. *Ann. d' Ocul.*, vol. 83, p. 60.

372. ISLER. Researches on the connection between **squint and refraction.** *Inaug.-Diss.*, Zurich. Among 369 cases of squint, there were 236 = 64 per cent. convergent squint, of which 208 = 88 per cent. showed H., and 4.6 per cent. M.: further 133 cases = 36 per cent. of divergent squint, with M. 62 times = 47 per cent., and H. in 17 per cent.

373. LEBER. Observations on paresis of accommodation and other disturbances of the ocular nerves by sausage poisoning. *A. f. O.*, vol. xxvi, 2, p. 236. Literature. The author contends that the toxic substance is an organic poison which, in its action, is similar to atropine.

374. V. MOLL. Over den invloed van de school of the Kortzichtigkeit. Rotterdam, *v. Hengel & Eeltjes.*

375. NAGEL. Anomalies of refraction and accommodation. *Graefe u. Saemisch's Handb. d. Augenheilk.*, vi, pp. 257–503.

376. PRIESTLEY-SMITH. Short sight in relation to education. An address delivered to the Birmingham Teachers' Association, Nov. 2, 1880.

377. SCHMIDT-RIMPLER. **Choroidal colobomata** and their relation to myopia. *A. f. O.*, vol. xxvi, p. 221–235. Axial myopia can only be produced by an ectasia which includes the yellow spot, and with our present knowledge of embryology, a direct connection between congenital disposition to myopia and the foetal fissure of the eye is thereby entirely excluded.

378. WEBSTER. Mixed Astigmatism. *N. Y. Med. Rec.*, vol. xviii. July 2.

MUSCLES.

379. BADAL. De la diplopie paralytique. *Ann. d' Ocul.*, vol. 84, p. 129.

380. BRESGEN. A case of paralysis of all the ocular nerves. *Deutsch. Med. Wochenschr.*, No. 39.

381. COUDRON ET DEBIERRE. (clinique du Dr. MEYER, Paris). Paralysie du muscle grand oblique de l'œil gauche d' origine traumatique. Guérison rapide. *Rev. d' Ocul. de Sud-Ouest*, 4, p. 79.

382. HIRSCHBERG. On the **quantitative analysis of diplopia in strabismus**. *Brit. Med. Assoc. at Cambridge; C. f. A.*, vol. v, pp. 19, 49. By the use of a plate upon which the distances, not the angles, are noted. The advantages for an accurate measurement of the degrees of binocular diplopia are shown for the different cases.

382*a*. KUBLI (clinic at Dorpat). Case of paralysis of ocular muscles. Paralysis of association toward the left side in a patient with hereditary taint. Cure. *Z. M.*, vol. xviii, p. 426.

383. LITTLE. A case of paresis of the inferior oblique and one of the superior oblique cured with iodide of potass., the faradic current, and strychnia. *Amer. Ophth. Soc.; A. O.*, vol. ix, p. 340.

384. NIEDEN. A case of **bilateral paresis of association,** of the sup. rect. and infer. obliq., with clonic spasms in the other ocular muscles. Inability to elevate the eyes over the horizon, or to the right or the left, both monocular and binocular. An attempt to execute those motions, with a fixed position of the head, caused spasms of the external and internal recti, which made the eyes move rapidly backward and forward. The acute affection indicated an apoplexy at the centre of the movements of the eyeball or in the occipital lobe, since with the attack a lasting amblyopia had appeared without any ophthalmoscopic changes. The patient was completely cured. *C. f. A.*, vol. iv, p. 209.

385. v. REUSS. Interesting cases of **nystagmus**. 1. One-sided horizontal nystagmus in a girl with central corneal opacity. 2. A boy with retinitis pigmentosa had horizontal nystagmus in one eye, rotating movements in the other. *C. f. A.*, vol. iv, p. 337.

386. SEGGEL. Statistics and cases in support of ULLRICH's theory of the etiology of convergent squint. *Z. M.*, vol. xviii, p. 439.

387. WARLOMONT. Du nystagmus. *Ann. d' Ocul.*, vol. 83, p. 5.

LIDS.

388. ARMAIGNAC. Kyste sébacé du grand angle de l' œil chez un enfant de trois ans. *Rev. d' Ocul. du Sud-Ouest.*, i, p. 55.

389. BERTHOLD. A tropho-neurosis in the first branch of the trigeminus. *C. f. A.*, vol. iv, p. 327. Symptoms: Itching sensation in the right lid. From the lid-margin over the superciliary arch almost to the margin of the frontal bone was a white patch, which was cooler than the surrounding skin. The upper lid infiltrated throughout up to the conjunctiva, which appeared whiter. The affected portion was anæsthetic. Relief by the induced current.

390. BULL, C. S. Vascular tumors of the eyelids. *Amer. Ophth. Soc.; A. O.*, vol. ix, p. 338.

391. HOTZ. Tonic blepharospasm of five months' duration, relieved by one application of tincture of iodine. *A. O.*, vol. ix, p. 283.

392. PURTSCHER (HIRSCHBERG'S clinic). Investigations on cancer of the lids. *A. O.*, vol. x, p. 46.

393. TALKO. Cysts of the eyelids. Seven cases. They are intra-uterine, and interfere with the development of the eyeball; the contents are serous, in some cases hemorrhagic. *Intern. Congr. of Milan; Progr. Méd.*

394. WILHELMI. A case of pseudo-chromhidrosis in a girl 14 years old. *Z. M.*, vol. xviii, p. 252.

LACHRYMAL APPARATUS.

395. EMMERT. Lachrymal diseases. The reaction was alkaline in all cases, but more so than under normal conditions. *Corresp. d. Schweiz. Aerzte*, 1880, No. 17, p. 562.

396. FUCHS. Dacryocystitis with perforation into the orbital cellular tissue. Symptoms: Exophthalmos; great diminution of vision; retinal hemorrhages; spontaneous perforation from the inner angle of the eye. *C. f. A.*, vol. iv, p. 252.

397. KNAPP. Three cases of **tumor of the lachrymal gland.** 1. Myxo-adenoma; extirpation with preservation of sight. 2. Recurrent carcinoma; the eye blind after the operation; 6 months [when last seen, 18 months. K.] later no recurrence. 3. Myxoädenoma carcinomatosum. *Amer. Med. Assoc.*, July, 1880; *C. f. A.*, vol. v, p. 60.

398. SAMELSOHN (Cologne). **Lithiasis gland; lacrimal.** In a child 3½ months old there was a concretion, 4 *mm.* in length, 2 *mm.* in height, weighing 6 *mgrm.*, which proved to be an osteochondroma containing carbonate and phosphate of lime. *C. f. A.*, vol. iv, p. 370.

ORBIT.

399. BENNETT. Melanotic sarcoma of the orbit. *Dubl. Journ.*, 70, p. 60.

400. BERGER. Kyste huileux de l' orbite. *Bull. de la Soc. Chir.*, No. 9.

401. BERLIN. The anatomical connection between orbital and intracranial inflammations. *Volkm. Samml. Klin. Vortr.*, No. 186.

402. BERLIN. The diseases of the orbit. *Graefe u. Saemisch's Handb. d. Augenheilk.*, vi, pp. 504–744.

403. CARRERAS ARÁGO. An exostosis eburnea, the size of a fist, which occupied the upper part of the right orbit and the cranium. *Intern. Congr. of Milan ; Progr. Méd.*

404. DAVIDSON, A. D. Congenital absence of the eyeball. *The Lancet*, ii, No. 25.

405. DESFOSSES. Kystes sudoripares du bord libre des paupières. *Arch. d' Ophth.*, i, p. 82.

406. GEISSLER, A. Vascular tumors of the orbit. *Schmidt's Jahrb. d. ges. Med.*, vol. clxxxvi, p. 273.

407. HEYL. Metastatic tenonitis in diphtheria. *Amer. Journ.*, vol. clviii, p. 429.

408. HIRSCHBERG. A case of **pulsating exophthalmos** on the left side of a woman 35 years old. An injury is said to have occurred one year previously. Amaurosis. Ligation of the carotid, with good result. S remained o. *C. f. A.*, vol. iv, p. 221.

409. HOTZ. A remarkable case of periostitis of the walls of the orbit. *A. O.*, vol. ix, p. 285.

410. KNAPP. Contribution to the **pathology of the frontal sinuses.** *A. O.*, vol. ix, p. 185. 1. An orbito-cerebral abscess originating from the left frontal sinus, with fatal issue ; abscess in left frontal lobe of the brain. 2. Polyps and pus in the right frontal sinus, orbital tumor, exophthalmus ; permanent cure by operation.

411. LEBER. Empyema of the frontal sinus, causing affections of the eye. *A. f. O.*, vol. xxvi, 3, p. 267.

412. LEBER. Meningitis after the enucleation of an eye which had no purulent panophthalmitis. Recovery. *A. f. O.*, vol. xxvi, 3, p. 207.

413. LEBER. Observations of **orbital abscess,** and its connection with erysipelas and thrombo-phlebitis, and its complications, especially thrombosis of the sinus, cerebral abscess, and abscesses in the temporal region. *A. f. O.*, vol. xxvi, 3, pp. 212–263.

414. QUAGLINO. Esostosi spugnosa dell' angolo esterno-inferiore dell' orbita sinistra, demolizione. Bibliografia dei tumori ossei dell' orbita. *Ann. di Ott.*, vol. ix, p. 287.

415. SATTLER. Pulsating exophthalmos, Basedow's disease. *Graefe-Saemisch's Handb. d. Augenheilk.*, vi, pp. 745–1024.

416. SCHMIDT-RIMPLER. High degree of exophthalmos of the left eye from an exostosis following upon a fracture of the orbital margin. *Z. M.*, vol. xviii, p. 327.

417. SCHMIDT-RIMPLER. Right-sided **pulsating exophthalmos** in a man after an injury. Protrusion immediately ; whirring noticed only two weeks later. Paralysis of the oculomotorius, abducens, trochlearis, facialis, and acusticus on the right side. Diagnosis : Perforation of the caroti in the sinus cavernosus, caused by a fracture of the base of the skull. Digital compression was tried. *Z. M.*, vol. xviii, p. 322.

418. SCIMEMI. Escisione del ganglio ottalmico nelle asportazione di un sarcoma dell' orbita e del antro d' Igmoro. *Ann. di Ott.*, vol. ix, p. 178.

419. TAPRET. Goître exophth. *Arch. Génér. de Méd.*, pp. 73, 87.

420. WICHERKIEWICZ. A further case of bilateral anophthalmos, with formation of cysts in the lower lids. *Z. M.*, vol. xviii, p. 399.

INJURIES.

421. AGNEW, C. Injury of the cornea by a foreign body. *Med. Rec.*, vol. xviii, 7, p. 171.

422. CAUDRON ET DEBIERRE (clinique de Prof. MEYER). Fragment d' acier logé dans l' iris. Tentations infructueuses d' estraction à l' aide d' un aimant. Iridectomie. Guérison. *Rev. d' Ocul. du Sud-Ouest*, 4, p. 81.

423. DEHENNE. Influence du surménage sur la marche des traumatismes de la cornée. *Franc. Méd.*, 3.

424. DELACROIX. Communication sur les traumatismes oculaires. *Progr. Méd.*, No. 35.

425. GALEZOWSKY. Des blessures de l' œil par les plumes d' acier dans les écoles primaires et de la nécessité d' y remédier. *Ann. d' Hygiène publ.*, Oct., 1880.

426. v. HASNER. Retrobulbar gunshot injury of both orbits. *Prag. Med. Wochenschr.*, Nos. 46, 47.

427. v. HASNER. The injuries of the eye in their forensic aspect. *Maschka's Handb. d. gerichtl. Med.*, 67 pages.

428. HOTZ. A small fragment of steel enters the eyeball near the margin of the cornea and passes out near the optic nerve. S=1. *A. O.*, vol. ix, p. 279.

429. HOTZ. A piece of gun-cap in the iris for 25 years. *A. O.*, vol. ix, p. 286.

430. KOETHE. Perforating wounds of the eyeball; statistics *Inaug.-Diss.*, Greifswald.

431. MURDOCH. Cases of injuries of the eyeball treated almost exclusively by rest. *Amer. Journ.*, vol. 158, p. 396.

432. NICOLINI. Di un corpo straniero nell' orbita (a piece of lead-pencil 7 *cm.* long). *Ann. di Ott.*, vol. ix, p. 301.

433. OGLESBY. Case of injury of the eye. *The Lancet*, vol. ii, No. 4.

434. OELLER. Traumatic aniridia and aphakia in an insane person, produced by pressing the fingers behind the outer orbital margin. *C. f. A.*, vol. iv, p. 255.

435. PESZKOWSKY. Cases from the forensic praxis. Fracture of the inner orbital margin, emphysema over the whole left side of the face and neck. *Wien. Med. Presse*, No. 34, p. 1089.

436. PONTI. Injury of an eye by an explosion of dynamite. *Intern. Congress of Milan; Prog. Méd.*

437. REULING. On the importance of expectative surgery in certain injuries of the eye by foreign bodies. *South. Clinic*, vol. iii, 1, p. 13.

438. SANTOS FERNANDEZ. Ossification intra-ocular abrededor de un cuerpo extrano metalico. *Il Siglo Med.*, No. 1395.

439. SCHENKL. A case of injury of the eye. Wound of the lid and sclerotic, without perforation of the latter membrane. *Prag. Med. Wochenschr.*, No. 36, p. 353.

440. SCHIESS-GEMUSEUS. Foreign bodies in the anterior chamber and upon the iris. *Correspondenzbl. d. Schweiz. Aerzte*, 1880, No. 17, p. 561. In seven cases extraction, in the eighth the foreign body remained in the eye without any irritation.

441. SCHIESS-GEMUSEUS. A piece of iron which had passed through the cornea and lens was lying free upon the retina ; the media clear and S good. *Z. M.*, vol. xviii, p. 383.

442. TREITEL. Aniridia totalis et aphakia traumatica. *A. f. O.*, vol. xxvi, 3, p. 109.

443. VOSSIUS (v. HIPPEL'S clinic). Contribution to injuries of the eye, especially of the lens and iris, by fragments of steel or stone. *Z. M.*, vol. xviii, p. 261.

PARASITES.

444. PRZYBYLSKI. Cystic. subconjunct. *Gac. Lekarska ; C. f. A.*, vol. iv, p. 379.

445. RAMPOLDI. Cisticerco retroretinico anat. dimostrato alla sezione del bulbo. Resenza della tænia solium nello stesso individuo. *Ann. di Ott.*, vol. ix, p. 264.

OCULAR AFFECTIONS IN CONSTITUTIONAL DISEASES.

446. BERLIN. The anatomical connection between orbital and intracranial inflammations. *Volkm. Samml. Klin. Vortr.*, No. 186.

447. BOUCHUT. The relations between diseases of the ear and diseases of the brain and eye. A patient with otorrhœa had hæmorrhages, choked disc, vertigo, epileptiform attacks, diminution of sight, amaurosis. Three months later, exudative neuro-retinitis and more frequent epileptiform attacks. The autopsy showed : caries of the petrous bone, no meningitis ; at the floor of the fourth ventricle was a tumor which had destroyed the origin of the optic nerve. *Intern. Congr. of Milan; Progr. Méd.*

448. DARIER. Du diagnostic des affections cérébrales au moyen de l'ophthalmoscope. *Prog. Méd.*, vol. vii, p. 80.

449. DRANSART. Considér. cliniq. et pathogénique sur les rapports pathologiques entre l' œil et l' oreille. *Progr. Méd.*, No. 34.

450. FERRADAS. Ocular affections in **pellagra,** frequently scrofulous conjunctivitis and keratitis, and varying from the simplest form of conjunctivitis to the most extensive changes in the fundus and panophthalmitis. *Intern. Congr. of Milan; Progr. Méd.; C. f. A.*, vol. iv, p. 383.

451. FIALKOWSKY (Russia). Ocular affections in **scurvy,** occurring there in 3.5 per cent. of the cases, most frequently as affections of the lid, palpebral

and bulbar conjunctiva, the cornea and the episcleral tissue. In some cases he observed hemeralopia. *C. f. A.*, vol. iv, p. 247.

452. FIEUZAL. Hæmorrhagic retinitis resembling albuminuric retinitis in a case of cerebral tumor, which had compressed one of the pedunculi. *Intern. Congr. of Milan; Progr. Méd.*

453. GEISSLER. Ocular affections of the female. *Berl. Klin. Wochenschr.*, No. 38.

454. HANCKE. The ophthalmoscopic diagnosis of circumscribed intracranial diseases. *Inaug.-Dissert.*, Berne.

455. HANSEN. Progressive pernicious anæmia. *N. Y. Med. Jour.*, vol. xxxii, 6, p. 668.

456. HILL. Nervous and neuralgic affections as symptoms of diseases of the eye. *Phila. Med. & Surg. Rep.*, vol. xlii, 14, p. 287.

457. HOTZ. Syphilitic iritis with gelatinous exudation. *A. O.*, vol, ix, p. 283.

458. JACKSON, HUGHLINGS. Ocular symptoms in **ataxia**. In 6 out of 19 cases the first symptom was diplopia, and white atrophy in one case. The narrowing of the pupil with contraction upon accommodation, but not upon light, seems to be one of the first symptoms. *The Lancet*, No. 25; *C. f. A.*, vol. v. p. 30.

459. JONES, EMRYS. Rupture of the eyeball in a patient suffering from hemorrhagic diathesis. *The Lancet*, No. 22.

460. KAHLER. Septic affections of the retina. *Prag. Med. Zeitschr. f. Heilk.*, vol. i, 2, pp. 111–132.

461. KIPP. Keratitis from malaria; superficial striped keratitis with detachment of the epithelium and a triangular ulcer. *Amer. Ophth. Soc.; A. O.*, vol. ix, p. 341.

462. LANDESBERG (Philadelphia). Contribution to the knowledge of the vasomotor neuroses of the eye. *Z. M.*, vol. xviii, p. 467. Two cases.

463. LANDSBERG (Görlitz). **Metastatic panophthalmitis** in a case of probable intermittent fever (tumor of the spleen, intermittent character of the fever, rapid disappearance upon the administration of quinine) with phthisis bulbi. Some months later fatal termination with symptoms of metastases in the brain and lungs. *C. f. A.*, vol. iv, p. 344, and vol. v, p. 61.

464. LUCHHAU. Eye and ear affections in recurrent fever. *Virchow's Arch.*, vol. lxxxii, pp. 18–26.

465. MACKENZIE. **Retinal hemorrhages** and degeneration in **scurvy** and in **idiopathic anæmia**. *The Lancet*, ii, 25.

466. MAUTHNER. **Brain and eye**. *Vortr. aus d. Gesammtgeb. d. Augenheilk.*, 6–8, Wiesbaden, Bergmann, 255 pages. An extensive treatise on the subject in clear and elegant style; he exhausts the symptoms, etiology, and pathogenesis of binocular hemianopsia, critically reviews the researches about the decussation of the nerve fibres in the chiasm, adopts the theory of partial decussation, and, upon clinical, anatomical, pathological, and experimental facts, the complete termination of each tract in the cerebral hemisphere of the same side. The hemiopic scintillating scotoma is supposed to be due to a circum-

scribed contraction of the blood-vessels which supply the tract. He further mentions the changes of the retina and optic disc which occur in cerebral and spinal affections and in insane persons, and finally speaks of the affections of the accessories, pupil, ocular muscles and nerves (paresis of association, conjugate deviation, nystagmus), and of the affections in diseases of the sympathetic and trigeminus.

467. NITOS, EMILE. Contrib. à l' étude de la syphilis et de la tuberculose oculaire. Paris, Baillière et fils, 1880, 144 pages.

468. RAMPOLDI. Rapporti morbosi essistenti tra gli organi digerenti e l' organo della vista. *Ann. di Ott.*, vol. ix, p. 121.

469. REMBOLD. The movements of the pupil and their importance in diseases of the central nervous system. *Mittheil. aus d. Ophth. Klinik zu Tübingen* (NAGEL), Laupp. No. 2.

470. SCHUBERT, P. Syphilitic affections of the eye (Prof. COHN'S clinic). Berlin, P. Lette, 1881, 140 pages.

471. DEL TORO Y QUARTIELLERS (Hosp. St. Juan de Dios, Cadiz). **Septicæmia of the eye, after** four **cataract extractions**; in two patients there were general septic symptoms, by which three eyes were lost and one patient died. As disinfectant, nitrous acid was used. *C. f. A.*, vol. iv, p. 384.

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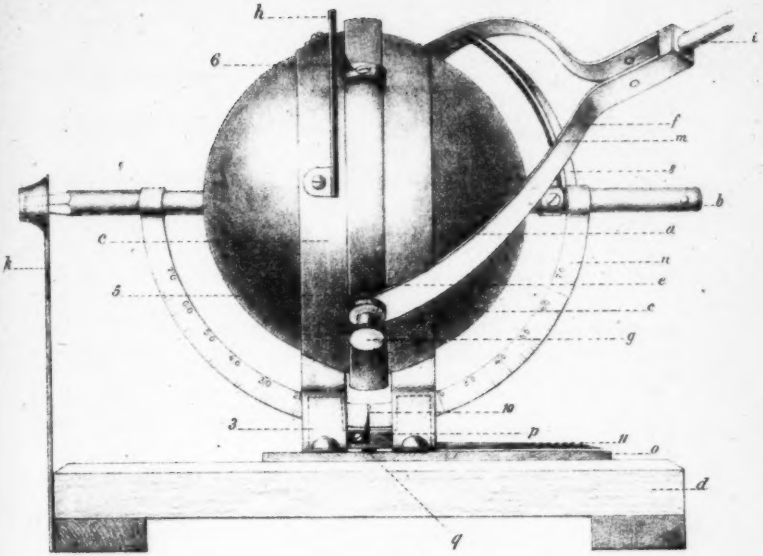
Fig. 1.



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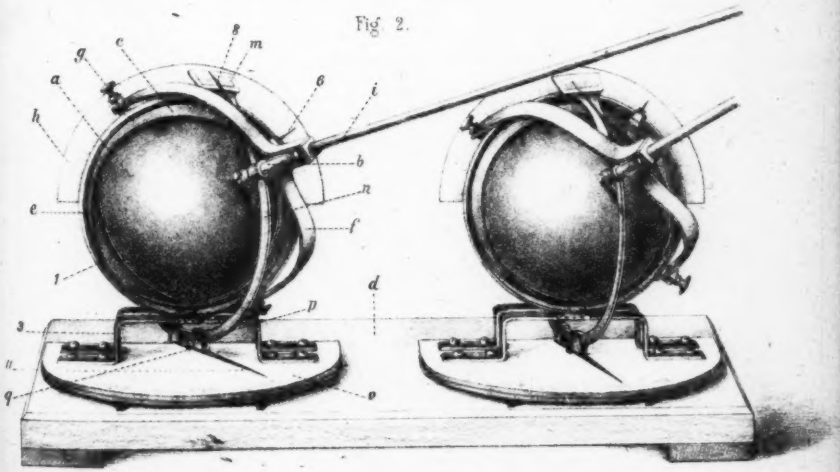

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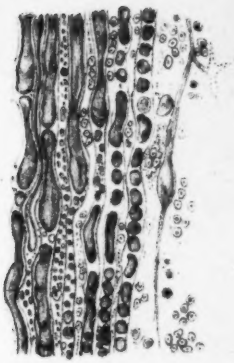
Fig. 1.

Fig. 2.



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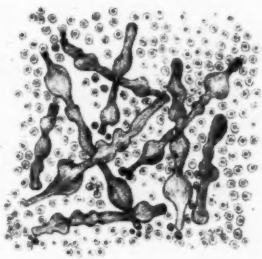

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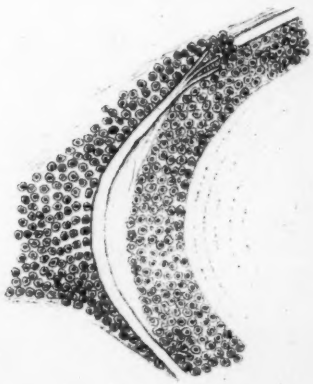

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